MATHEMATICAL MODELING AND ANALYSIS OF THE RELATIONSHIPS AMONG RESOURCE ALLOCATION PATTERNS AND GENDER PROPORTIONALITY IN INTERCOLLEGIATE ATHLETICS

By

MARYELIZABETH M GRACE

A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

1996

UNIVERSITY OF FLORIDA LIBRARIES

I dedicate this study to my parents,
Barbara W Grace and Thomas V Grace
Their love and support has made this dissertation possible

ACKNOWLEDGMENTS

I would like to acknowledge the faculty, administrators, and professionals who have been instrumental in the compilation and completion of this work.

I am thankful to Dr. Ursula Walsh, Director of Research at the National Collegiate Athletic Association, and her staff who helped to supply the data that served as the basis for this research. I am appreciative of Ann Marie Rogers, Associate Athletic Director, and the staff of the University of Florida Athletic Association for their backing and support.

I am especially grateful to Dr. David S. Honeyman, my mentor, for his guidance and support throughout this project. I would also like to acknowledge the other members of my committee for the generosity of their time and effort: Dr. Dale F. Campbell, Dr. M. David Miller, Dr. N. Sue Whiddon, and Dr. R. Craig Wood.

For all these efforts, I am sincerely grateful.

TABLE OF CONTENTS

Page

ACKNOWLEDGMENTS ... iii

LIST OF TABLES ... vii

ABSTRACT ... ix

CHAPTERS

1 BACKGROUND OF THE STUDY ... 1

Introduction ... 1
Background to the Problem ... 3
Purpose of the Study ... 5
Need for the Study ... 6
Definition of Terms ... 8
Limitations ... 10
Organization of the Study by Chapters ... 13

2 REVIEW OF THE LITERATURE ... 14

Introduction ... 14
History of Women in Sport ... 14
Title IX of the Education Amendments of 1972 ... 17
Historical View of Title IX ... 18
Compliance with Title IX ... 23
Gender Equity ... 27
Current State of Gender Proportionality ... 28
Recent Title IX Litigation ... 31
Cohen v Brown University ... 31
Beth Pederson v Louisiana State University ... 32
Roberts v Colorado State Bd of Agriculture ... 33
Favia v Indiana University of Pennsylvania ... 34
Kelly v Board of Trustees of the University of Illinois ... 35

Title IX Settlements 36
Benefits of Increased Athletic Participation 38
The National Collegiate Athletic Association 39
Finance of Intercollegiate Athletic Programs 44
Sources of Revenue and Expenses in Intercollegiate Athletics 46
Other Studies Using Mathematical Models and Analysis of Variance Techniques 48
Chapter Summary 55

3 PROCEDURES 56

Introduction 56
Selection of Data 56
Population and Sampling 58
Instrumentation 59
Collection of Data 62
Statement of Variables 63
Qualitative Reasons for the Selection of Variables 69
Statistical Analyses 76
Null Hypothesis and Alpha Level 80
Chapter Summary 82

4 PRESENTATION OF DATA 84

Introduction 84
Descriptive Analysis of the Data 87
Descriptive Analysis of the Resource Allocation Variables 93
Correlation Analysis of the Resource Allocation Variables 98
Determination of the Significance of the Mathematical Models 102
Determination of the Relationships Between Individual Resource Allocation Variables and the Categories of Gender Proportionality 107
Determination of the Relationships Between Individual Resource Allocation Variables and the NCAA Divisional Levels 116
Determination of the Relationships Between Individual Resource Allocation Variables and the Football Statuses of NCAA Member Institutions 124
Summary 129

5 CONCLUSIONS AND RECOMMENDATIONS 132

Introduction 132
Discussion of the First Mathematical Model 134

Discussion of the Second Mathematical Model.. 137
Discussion of the ANOVA Tests on the Categories of Gender Proportionality 140
Discussion of the ANOVA Tests on the NCAA Divisional Levels 147
Discussion of the ANOVA Tests on the Football Status of NCAA Member Institutions 157
Conclusions 161
The Models.. 161
Equipment, Travel, and Salary 163
Grants-in-Aid 167
Capital Expenditures 169
Fund-Raising and Recruiting 170
Suggestions for Further Research 171
Studies Requiring Additional Information 172
Studies Requiring Reporting Changes 173
Studies on the Capital Expenditures Resource Allocation Variable 175
Studies on the Equipment, Travel, and Salary Resource Allocation Variables 177
Studies on Grants-in-Aid for Female Athletes 178
Studies on Fund-Raising and Recruiting for Women's Sports 178
Final Conclusion 179

APPENDIX 180

REFERENCES 189

BIOGRAPHICAL SKETCH.. 194

LIST OF TABLES

Table		page
1	1992-93 NCAA Financial Survey Responses by Divisional Level	62
2	Definition of Non-Financial Variables Used in the Study	67
3	Definition of Resource Allocation Variables Used in the Study	68
4	Useable Institutional Data Sets by Divisional Level	87
5	Distribution of the Gender Proportionality Variable PROP	89
6	Distribution of the Categorical Variable CATPROP	90
7	Distribution of the Categorical Variable DIVISION	92
8	Distribution of the Categorical Variable FTBALL	92
9	Resource Allocation Statistics for the Entire Data Set.	94
10	Resource Allocation Statistics by Category of Gender Proportionality	95
11	Resource Allocation Statistics by Divisional Level	97
12	Resource Allocation Statistics by Football Status	99
13	Correlation Analysis of the "PT" Resource Allocation Variables	100
14	Correlation Analysis of the "PC" Resource Allocation Variables	102
15	Results of the Multiple Regression Analysis on the First Model	103
16	Parameter Estimates and Tests for Individual Significances in the First Model	105
17	Results of the Multiple Regression Analysis on the Second Model	106

Table		page
18	Data Points for Each "Percent of Category" Resource Allocation Variable	107
19	ANOVA Tests Between the Categories of Gender Proportionality and Each "PT" Resource Allocation Variable	109
20	Post Hoc Test Between the Categories of Gender Proportionality and the 'PT' Resource Allocation Variable	110
21	ANOVA Tests Between the Categories of Gender Proportionality and Each "PC" Resource Allocation Variable	112
22	Post Hoc Tests Between the Categories of Gender Proportionality and "PC" Resource Allocation Variables	114
23	ANOVA Tests Between the NCAA Divisional Levels and Each "PT" Resource Allocation Variable	117
24	Post Hoc Tests Between the NCAA Divisional Levels and "PT" Resource Allocation Variables	119
25	ANOVA Tests Between the NCAA Divisional Levels and Each "PC" Resource Allocation Variable	121
26	Post Hoc Tests Between the NCAA Divisional Levels and "PC" Resource Allocation Variables	123
27	ANOVA Tests Between Football Statuses and Each "PT" Resource Allocation Variable.	126
28	ANOVA Tests Between Football Statuses and Each "PC" Resource Allocation Variable	128

Abstract of Dissertation Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy

MATHEMATICAL MODELING AND ANALYSIS OF THE RELATIONSHIPS AMONG RESOURCE ALLOCATION PATTERNS AND GENDER PROPORTIONALITY IN INTERCOLLEGIATE ATHLETICS

By

MARYELIZABETH M GRACE

August 1996

Chairman David S Honeyman
Major Department Educational Leadership

The purpose of this study was to develop and analyze mathematical models to explain the relationships among resource allocation patterns and gender proportionality in intercollegiate athletics using two different frames of reference A further purpose was to study the relationships between individual resource allocation variables believed to play a significant role in achieving gender proportionality and three categories of gender proportionality three divisional levels, and football status

Analyses were performed on data collected through National Collegiate Athletic Association (NCAA) surveys from 473 member institutions for the 1992-93 fiscal year Mathematical models were analyzed through the use of multiple regression, while analysis of variance techniques were used to test for the existence of significant difference(s) between group means on the three categories of gender proportionality, the

three divisional levels, and football status on each of seven resource allocation variables appropriated to women's sports grants-in-aid, fund-raising, recruiting, equipment, travel salary, and capital expenditures

The first model was significant with salary identified as an individually significant variable The second model was not significant, most likely due to the problems associated with this analysis All three sets of analyses on gender proportionality, divisional level, and football status identified significant relationships Important findings were as follows 1) equipment, travel, and salary continually surfaced as the variables most strongly related to gender proportionality, 2) there appeared to be a limit in the extent to which increasing grants-in-aid for women improved gender proportionality; and 3) analyses on fund-raising, recruiting, and capital expenditures did not identify any conclusive relationships with gender proportionality

The study's results could potentially aid administrators in determining if existing resources are allocated in the most efficient and cost effective manner possible or if changes can be made that could potentially increase the number of opportunities for women under current budgetary constraints No published literature has attempted to identify relationships between resource allocation patterns and gender proportionality in intercollegiate athletics, therefore, the findings of this study provide a basis for the establishment of literature in the field and serve as a foundation for further research.

CHAPTER 1
BACKGROUND OF THE STUDY

Introduction

Perhaps the most fundamental social change in American life in the last 20 years has been the changing role of women, and nowhere is this change better reflected today than in intercollegiate athletics. Gender equity in intercollegiate athletics has become national headline news forcing university presidents to take notice and initiating heated debates concerning the changes needed to further women's athletics In fact, gender equity in intercollegiate athletics is thought by many to be the most powerful issue that confronts athletic administrators interested in maintaining and supporting quality intercollegiate athletics Although this issue has brought about differing levels of response, one fact holds true nationally gender equity brought about by Title IX of the Education Amendments of 1972, has changed and will continue to change the environment in which intercollegiate athletics must operate

Title IX of the Education Amendments of 1972 is a federal civil rights statute that prohibits sex discrimination in education programs that receive or benefit from federal funding Although it applies to all areas of federally-funded education, Title IX has become synonymous with gender equity in athletics However, until recently, few colleges or universities had fully complied with the law In fact, at the start of this decade, more than half of the postsecondary students in the United States were female

while approximately a third of college athletes were female, NCAA statistics revealed that in 1990-91 only 31% of Division I athletes, 32% of Division II athletes and 35% of Division III athletes were female (National Collegiate Athletic Association, 1993)

In the past few years, however, gender equity has entered a whole new phase Women athletes, their coaches, and many of their administrators are now insisting that Title IX not be ignored any longer and are demanding equal opportunity with their male counterparts (Frankel, 1992) This has caused colleges and universities to come under more pressure than ever to comply with the law and provide more equitable athletic opportunities for women. The supporters of this movement have been given negotiating power by several factors including the Supreme Court decision in *Franklin v Gwinnett County Public Schools* 112 S Ct. 1028 (1992) that paved the way for female athletes to seek monetary damages for intentional discrimination in federally funded programs and a heightened public awareness about sex discrimination This newly acquired power has caused the gender equity movement to erupt with ramifications on virtually every campus in the nation (Smolka, 1995)

In summary, changes brought about by Title IX have been slow in coming However, in recent years both the courts and the federal government have been encouraging institutions to comply with the full intent of the law The current trend is toward a stricter, case-by-case analysis of Title IX compliance with more severe penalties for noncompliance (Curtis, 1995) This trend has caused mandates by university presidents, conference commissioners, and the NCAA, and it ultimately means that some dramatic changes in intercollegiate sports programs are most likely ahead

Background to the Problem

Proportionality is a term used in intercollegiate athletics to define a situation in which an institution's percentages of male and female athletes are approximately equal to the overall percentages of male and female students at that institution. Proportionality is the most tangible test of Title IX compliance and is also the source of many of the most sweeping changes in intercollegiate athletics (Smolka, 1995). Therefore, proportionality is commonly considered to be the ultimate legal test of Title IX compliance (Bonnette, 1994).

The goal before most Title IX committees is to try to achieve gender equity while maintaining an institution's competitiveness. This includes accomplishing proportionality by adding opportunities for women while not taking opportunities away from men, and this requires money. In fact, it is well documented that progress toward gender equity requires a tremendous financial commitment (Hattig, 1994). However, Title IX does not legislate funding for women's sports, it simply calls for equal opportunity. For this reason, much of the Title IX argument has focused on funding and how institutions can implement gender equity.

Complicating matters is the reality of declining resources for education. State institutions across the country have been faced with legislatures under increasing pressure not to raise taxes while competition for public dollars continues to increase. This has resulted in fewer dollars for public higher education. The private sector of higher education has also been faced with declining resources. Not only are private institutions receiving a declining amount of state and federal support, but the general decline in

national income combined with rising tuition rates have also meant that fewer potential students are able to afford the larger portion of disposable income that must be spent on a private education. Further, stricter tax codes have discouraged corporate donations and endowments that once helped to subsidize private institutions.

With diminishing budgets currently being the norm in higher education, most intercollegiate athletics programs are faced with flat revenues at best. Further, as revenues remain stagnant, expenses such as the cost of scholarships, travel, insurance and equipment continue to spiral. This means that the majority of athletics programs have fewer real dollars with which to work.

It is apparent that three gender equity scenarios exist: 1) an institution must find additional sources of funding to support increased participation opportunities for women, 2) the institution must decrease men's participation opportunities to bring the percentages more in balance, or 3) an institution must reallocate existing resources and improve efficiency thereby increasing women's opportunities while not diminishing men's opportunities. The third scenario formed the basis for this study.

Although the first scenario may be feasible for some institutions, additional funding to increase women's opportunities will most likely continue to be difficult to come by for the majority of our nation's institutions. Some additional sources of revenue for intercollegiate athletic programs have been identified such as support from former athletes, booster support, additional fund-raising activities, estate planning, and female team merchandising. However, there is little evidence that institutions have wholeheartedly adopted these practices, therefore, the effectiveness of these measures is

debatable. Further, more public support for state incentives is needed, however, until legislation is passed, institutions cannot count on these incentives for additional revenue.

Secondly, gaining proportionality by decreasing men's opportunities is not the intent of the law nor a desirable solution for female or male athletes. The intent of the law is to provide women with more participation opportunities. Decreasing men's opportunities may result in more equitable numbers, but it does nothing to improve the situation for women.

Therefore, a practical solution appears to be a complete reexamination of athletic program budgets with the goal of identifying ways to support increased opportunities for women. As such, athletic programs could follow the trend in higher education of streamlining the budget, increasing efficiency, and supporting more opportunities with fewer real dollars.

Purpose of the Study

Institutions of higher education are being encouraged to comply with the full intent of Title IX, they are under more pressure than ever to provide equitable athletic opportunities for women. For this reason, athletic administrators interested in maintaining and supporting quality intercollegiate athletics must make the necessary changes to come into compliance with this law. Further, the current trend of flat revenues and spiraling expenses most likely means that little additional revenue can be generated to increase women's opportunities at the majority of our nation's institutions of higher education. Therefore, administrators will most likely need to completely reexamine their current allocation patterns and reallocate resources with a larger portion going toward

those areas which help to increase women's participation opportunities As is occurring in the rest of higher education, administrators will be forced to operate with greater efficacy on a smaller budget

The purpose of this study was to develop and analyze mathematical models to explain the relationships among resource allocation patterns and gender proportionality in intercollegiate athletics using two different frames of reference. A further purpose was to study the relationships between individual resource allocation variables believed to play a significant role in achieving gender proportionality and three categories of gender proportionality, three divisional levels, and football status currently found at NCAA member institutions. The results of this study could potentially aid administrators in determining if existing resources are allocated in the most efficient and cost effective manner possible or if changes should be made that could potentially increase the number of opportunities for women under current budgetary constraints Therefore, the overarching goal of the study was to aid athletic administrators in the reexamination of resource allocation patterns by providing direction for the reallocation of program funds thereby enabling institutions to achieve compliance without sacrificing competitiveness or fiscal soundness

Need for the Study

No published studies to date have been conducted to determine which resource allocation factors are significantly related to gender proportionality However, knowing which variables significantly affect participation rates could aid institutions in determining how resources can be reallocated to increase female participation

opportunities while not sacrificing the competitiveness or fiscal soundness of their athletic programs. Therefore, this research was necessary because the models created by this study and the individual relationships identified through this study could potentially provide guidelines that institutions can follow as they strive toward gender proportionality.

Through developing and analyzing these mathematical models to explain the relationships among resource allocation patterns and gender proportionality in intercollegiate athletics, and through understanding the relationships between individual resource allocation variables and three categories of gender proportionality, three divisional levels, and football status currently found at NCAA member institutions, athletic administrators should be better able to make the necessary changes to come into compliance with Title IX. Athletics administrators must decide if their institutions' strides toward gender equity will involve transferring a small portion of several different budgets to women's sports or whether more drastic cuts in a few areas are needed. They must also make decisions about which resource allocation factors are the key variables that need to be increased if gender proportionality is to be attained. The results of this study should help administrators make better and more informed decisions regarding these questions and issues.

In summary, athletics administrators are currently faced with some very difficult circumstances. Therefore, the ability to comparatively evaluate their programs through gudelines concerning the importance of different resource allocation patterns to gender

proportionality in intercollegiate athletics could prove invaluable in the decision making process

Definition of Terms

The gender proportionality variables in this study have been derived from the proportionality of the number of women in the undergraduate student population and the number of female varsity athletes at each institution. As will be discussed in subsequent chapters, this degree of proportionality has become the dominant criterion in achieving compliance with Title IX. In order to be found in compliance with this criterion, substantial proportionality must be attained. The Office of Civil Rights (OCR), the agency charged with enforcing Title IX, discusses substantial proportionality as follows:

> [I]t could be argued that to satisfy [proportionality] there should be no difference between the participation rate in an institution's intercollegiate athletic program and its full time undergraduate enrollment. However, because in some circumstances it may be unreasonable to expect an institution to achieve exact proportionality--for instance, because of natural fluctuations in enrollment and participation rates or because it would be unreasonable to expect an institution to add athletic opportunities in light of the small number of students that would have to be accommodated to achieve exact proportionality--the Policy Interpretation examines whether participation opportunities are "substantially" proportionate to enrollment rates. Because this determination depends on the institution's specific circumstances and the size of its athletic program, OCR makes this determination on a case-by-case basis, rather than through use of a statistical test. (Office of Civil Rights, 1996)

There is definite merit to evaluating institutions on an individual basis. However, this individual review generally occurs when an institution is thought to have serious compliance problems, while the vast majority of institutions are offered little guidance under the OCR's current reluctance to use a statistical test. If the OCR were to adopt a statistical definition of substantial proportionality, less subjective and clearer guidelines

could offer more comprehensive assistance to institutions striving to achieve proportionality. Further, a more concrete definition of proportionality was required for the purposes of this study, or would be needed for any study in this area.

Therefore, legal precedents were used to establish this definition because they currently serve as the only concrete guidelines for this test of compliance. A difference of five percentage points between the percentage of women in the full-time undergraduate student population and the percentage of female varsity athletes has been the most common cutoff point in recent court decisions as well as out-of-court settlements. For this reason, substantial proportionality was defined as a difference of less than or equal to five percentage points. It should be noted that this difference can be in either direction (i.e., women may be over represented in the varsity athlete composition making the difference negative), therefore, the term was defined as a difference of less than or equal to five percentage points in either direction from exact proportionality. Institutions that fell within this demarcation of substantial proportionality were designated with an "SP."

Two further demarcations were used in this study. Because it was felt that a distinction must be made between institutions that are close to being categorized as substantially proportionate and institutions that will require a major overhaul to come into compliance, the categories of borderline proportionality and non-proportionality were created. Once again, no published precedent has been set to distinguish borderline compliant institutions from ones that have a long way to go to achieve compliance, but a concrete definition of this term was required for the purposes of this study. Therefore, as will be explained later, the definition was formulated based upon what appeared

reasonable from a working knowledge of this area. Further, if the OCR would like to adopt a statistical definition of these categories of proportionality, these definitions might guide their development

Borderline proportionality was defined as a difference in percentages greater than or equal to six percentage points but less than or equal to 15 percentage points in either direction from exact proportionality (i e , negative or positive) Again, this definition was formulated as being a reasonable cutoff point between institutions that can most likely achieve compliance by increasing the squad sizes of one or more women's teams or by adding an additional sport for women and those institutions that will require more dramatic changes in order to achieve compliance Institutions that fell within this demarcation of proportionality were designated with a "BP"

Lastly, non-proportionality was defined as a difference in percentages greater than or equal to 16 percentage points in either direction from exact proportionality Institutions in this category will most likely require a complete reexamination of their athletic programs if substantial proportionality is to be achieved. Institutions will probably need to add two or more sports for women to bring percentages in-line Since this may be nearly impossible to do under current resource limitations, this category represents the institutions that may need to consider more drastic measures to correct the current injustice Institutions that fell in this category were designated with an "NP"

Limitations

The greatest limitation of this study was its generalizability The models and individual relationships developed in this study were formed using resource allocation

data from member institutions of the National Collegiate Athletic Association (NCAA) NCAA member institutions were chosen due to the availability of standardized financial information and gender proportionality data on these institutions Further, the NCAA is by far the largest athletic association in this country However, since NCAA institutions formed the population, the results of this study cannot be expanded to institutions outside this membership

Several other athletic associations that colleges and universities belong to were not incorporated in this study A few such associations are the National Association of Intercollegiate Athletics (NAIA) the National Small College Athletic Association (NSCAA), the National Christian College Athletic Association (NCCAA), and the National Junior College Athletic Association (NJCAA) The NAIA is a voluntary association with approximately 411 member institutions ranging in size from about 500 students to about 1100 students (fairly small institutions) The institutions in the NSCAA are even smaller with enrollments of less than 500 undergraduate students The NCCAA, which is composed of 104 members, is only open to four-year Christian institutions that are willing to subscribe to a "Statement of Faith." Lastly, the NJCAA encompasses men's and women's junior college athletic programs Therefore, although the results are generalizable to the nearly 900 institutions across the country that comprise the NCAA, they are not generalizable to these other athletic associations The lack of expandability to other associations was especially unfortunate since it is often the smaller institutions that experience the most difficulty raising female participation rates.

Just as the population served as a limitation, the sample used in this study also served as a limitation. This occurred because the sample was obtained through volunteer sampling. The volunteer sampling could potentially have created a bias in those data that posed a threat to the external validity or generalizability of these results. A random sampling of the population could have eliminated this threat to external validity and increased the study's generalizability as well as the inferences and interpretations that could be made from the study's findings. Unfortunately, the nature of the study did not allow for this type of design.

Lastly, this study did not address the concepts of compliance versus noncompliance with Title IX, it only addressed the concept of proportionality. Proportionality is considered to be the ultimate legal test of Title IX compliance (Bonnette, 1994), and by attaining proportional participation rates, compliance with this aspect of Title IX is achieved. However, other ways in which an institution may prove to be in compliance with this aspect of Title IX will be discussed in the subsequent review of the literature. If an institution has met all of the interest in intercollegiate athletics but still has participation percentages that are disproportionate, compliance is said to have been achieved. On the other hand, if an institution has shown that it is working toward equitable athletic participation (toward achieving proportionality or fulfillment of all interest at that institution), it is also said to be in compliance for the time being.

Therefore, the study attempted to identify the resource allocation variables that played a significant role in achieving proportionality, but it did not determine if this proportionality was necessary to achieve compliance or if full compliance would be

achieved if proportionality was attained. It should be mentioned, however, that only a handful of institutions across the country can currently claim that all intercollegiate athletic interest has been met on their campuses, and if an institution is said to be in compliance by the last method listed above, it will still need to continue working toward proportionality or its status of "in compliance" will soon be changed

Organization of the Study by Chapters

This study of the relationships among resource allocation patterns and gender proportionality in intercollegiate athletics is organized into five chapters Chapter 1 serves as an introduction to the problem consisting of the background to the problem, the purpose of and need for the study, the definition of terms used in the study, and the limitations of the study Chapter 2 presents a review of pertinent literature. The procedures used in this study are described in Chapter 3 Chapter 4 consists of a presentation and discussion of the data. Lastly, the findings, conclusions, and recommendations are given in Chapter 5

CHAPTER 2
REVIEW OF THE LITERATURE

Introduction

Relevant literature supporting the need to determine which resource allocation categories are significantly related to gender proportionality in intercollegiate athletics is presented in this chapter. The chapter begins with a history of women's participation in intercollegiate athletics in the United States establishing the precedent of continued expansion. Secondly, Title IX of the Education Amendments of 1972 as it pertains to gender proportionality in intercollegiate athletics is developed as well as litigation and settlements that help define an institution's legal responsibilities in this area. Thirdly, the current state of gender proportionality in intercollegiate athletics is explored with the intent of showing the present inequities. Fourthly, intercollegiate athletic funding is discussed to highlight the lack of additional resources that the majority of our nation's institutions have available to increase gender proportionality. Finally, the case is made for the use of mathematical models and analysis of variance techniques in this study through a look at other studies using these methodologies to solve similar types of problems in an educational context.

History of Women in Sport

The history of American women in sport began in the mid-nineteenth century. In 1850, Dalphine Hanna of Oberlin College developed the first athletic program for women

when Oberlin replaced physical labor with sports as the required physical components of the curriculum. Gradually, the curriculums of other women's colleges began offering courses that emphasized developing both physical strength and mental ability in an attempt to prove to America that women could perform on the playing fields as well as in the classroom (Florida Study Commission, 1993)

The first competitive programs were established in 1892 at Smith and Mount Holyoke colleges with the introduction of women's basketball (Florida Study Commission, 1993) However, around the turn of the century there were an abundance of physical educators who disapproved of competitive team sports for women because they were considered unfeminine and injurious to women's health Instead, an athletics philosophy of "the greatest good to the greatest number" was born in the 1920s. This philosophy stressed intramural competition such as field days, rally days, and class days instead of competitive events, and it resulted in a decline in the number of competitive events for women These "play days" continued to be the model for women's sports through the 1960s (Florida Study Commission, 1993) However, the following decade brought about the most important piece of history regarding participation of women in education-related athletic programs in this country

This event was the enactment of Title IX of the Education Amendments of 1972 whose simple language opened the door of opportunity for women. Since Title IX's inception, the opportunity for female athletes to participate in intercollegiate sports has increased markedly. For example, in 1977, one year before the Title IX compliance date, the number of sports offered to women was 5 61 per institution By 1980 the number had

grown to 6 48, in 1986 the number of sports was at 7 15, and in 1988 the number had grown to 7 31 (Acosta & Carpenter, 1990)

The structure of sports for women in the United States has also changed considerably in the last twenty years (Acosta & Carpenter, 1990) Women's intercollegiate athletics developed its first formal structure in 1971 with the formation of the Association of Intercollegiate Athletics for Women (AIAW) By the late 1970s, the AIAW had greatly enlarged in membership and financial base, and this governing organization rapidly became a second cause of the massive growth in the number of women participating in intercollegiate athletics (Acosta & Carpenter, 1990) However, the existence of the AIAW was short lived. When the National Collegiate Athletic Association (NCAA) began offering a governance structure for women's sports in the early 1980s the AIAW filed an anti-trust lawsuit against the NCAA In *Association of Intercollegiate Athletics for Women v National Collegiate Athletics Association*, 558 F Supp 487 (D D C 1983), 735 F 2d 577 (D C Cir 1984) the courts held that the NCAA's dominance of the amateur sports television market did not by itself create a monopolistic practice against a rival association The lawsuit failed, and the AIAW left the field of national governance organizations on June 30, 1982.

From that day forward, national governance for both male and female intercollegiate athletics has been predominantly the responsibility of the NCAA. However, a smaller number of institutions have been and continue to be governed by the National Association of Intercollegiate Athletics (NAIA), the National Small College

Athletic Association (NSCAA), the National Christian College Athletic Association (NCCAA), and the National Junior College Athletic Association (NJCAA)

Title IX of the Education Amendments of 1972

Title IX of the Education Amendments of 1972 is a federal civil rights statute that prohibits sex discrimination in education programs that receive or benefit from federal funding Since nearly all institutions of higher education benefit from federal funding, nearly all institutions must comply with Title IX. The scope of these amendments includes athletics programs, therefore, Title IX serves as the principal federal legislation related to gender equity for intercollegiate athletics programs

Title IX of the Education Amendments of 1972 provides that

> No person. .shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity [other than those specifically described in the Act] receiving federal financial assistance (20 U S C § 1681 (1988))

The Title IX statute is the law enacted by the U S Congress stating the general requirements for nondiscrimination on the basis of sex The Title IX regulation, on the other hand, was written by employees of the enforcement agency given the responsibility of enforcing Title IX. This was originally the Department of Health, Education, and Welfare (HEW), but the jurisdiction for Title IX has been with the Office for Civil Rights (OCR) within the U S Department of Education since the governmental reorganization Since the regulation was submitted to Congress for review, it is also regarded as the law, but provides greater specificity than the Title IX statute

A third source of information related to Title IX, the Intercollegiate Athletics Policy interpretation, is the enforcement agency's interpretation of the Title IX regulation with regard to athletics The OCR issued the policy interpretation to clarify the Title IX regulatory requirements for athletic programs Although the policy interpretation was not reviewed by Congress and therefore does not have the status of law in recent years it has been afforded considerable deference by the courts, courts generally respect the OCR s interpretations since Congress explicitly delegated to the agency the task of prescribing standards for athletic programs under Title IX The Title IX regulation and policy interpretation currently serve as the two primary sources of specific gender equity requirements for athletic programs

Historical View of Title IX

Title IX was enacted by Congress on July 1, 1972, as Public Law 92-318 (20 U S C § 1687 (1972)) However, when it became apparent that Title IX could require that there be no sex discrimination in educational athletic programs or activities, particularly men's revenue-producing collegiate athletic teams, a long process of citizen involvement began, and members of Congress introduced a number of bills and amendments that would restrict or dilute Title IX. Although Congress defeated the proposed legislation, Congress did pass the Javits Amendment (Section 844 of the Education Amendments of 1974, Pub L 93-380, 88 Stat 612 (1974)) which required HEW to issue proposed reasonable regulations for intercollegiate athletic activities considering the nature of the sports

Proposed Title IX regulations designed to implement Title IX were subsequently introduced by HEW in 1974 and on May 27, 1975, President Gerald Ford authorized the final regulations The regulations were then submitted to Congress for review and on July 21, 1975, the Title IX regulations became effective (45 C F R. § 86 (1975)) The Title IX regulations pertaining to athletics had governance over intercollegiate athletics and provided educational institutions a transition period for compliance; the date of compliance set for post secondary schools was July 21, 1978

The Title IX regulations were widely criticized as being vague and inadequate Therefore, due to the large amount of uncertainty by colleges and universities over the elements of equal opportunity required to ensure compliance, HEW issued a policy interpretation on December 11, 1979 (44 Fed Reg 71,413 (1979)) The policy interpretation is the enforcement agency's interpretation of the Title IX regulation with regard to athletics Although this interpretation helped to clarify Title IX with respect to intercollegiate athletics, it also served to slow down the compliance process since institutions were able to delay making any changes while the policy interpretation was being developed (Heckman, 1992) It was not until seven years after the original passage of Title IX that the OCR, the successor to HEW, released the interpretation and began enforcing this law

However, 1979 also marked the year that the Supreme Court had a monumental ruling in the early history of Title IX In *Cannon v University of Chicago* 441 U S 677 (1979), the Supreme Court ruled that private parties had the right to bring suit to enforce Title IX. Although it was generally accepted that courts could grant only equitable relief

such as injunctions, the backing of the judicial system did much to advance Title IX The following year, the Title IX regulations were recodified (34 C F R. § 106 (1980)) with the establishment of the Department of Education in order to grant the necessary authority to this new federal agency to oversee the enforcement of the Title IX

After several years of progress in the late 1970s and early 1980s, Title IX suffered a setback in 1984 when the Title IX regulation and policy interpretation were nullified with regard to intercollegiate athletics through a ruling stating that Title IX should not apply to these programs Since the inception of Title IX in 1972, a question surrounded whether the legislation applied only to the specific departments which received direct funding (the "programmatic approach"), or whether the legislation was extended to any department within an institution that benefitted from federal assistance (the "institutional approach") (Wong, 1994) In *Grove City College v Bell*, 465 U S 555 (1984), the Supreme Court of the United States held that Title IX did not apply to programs such as athletics that did not receive direct financial assistance The Supreme Court ruled that the language of Title IX made it program-specific, in other words, only those programs directly receiving federal funds were subject to the regulations of Title IX. Therefore, this ruling applied to schools that participated in the basic educational opportunity grants (BEOG) program only Otherwise, one student receiving federal aid would trigger Title IX coverage of the entire institution, and the Supreme Court felt that this was not the intention of the program-specific language of the legislation. Due to this nullification, the next four years were years in which athletic scholarships for women were reduced and

few advancements were made in women's intercollegiate athletic programs (Acosta and Carpenter, 1990)

However, in March of 1988 Congress enacted, over a presidential veto, the Civil Rights Restoration Act of 1987 (1988 Amendments), P L 100-259, 102 Stat. 28 (1988) (codified at 20 U S C § 1687), superseding the Supreme Court's ruling in *Grove City College*. Enactment of this legislation served, "to restore the broad scope of coverage and clarify the application of Title IX of the Education Amendments of 1972." This act provided that all aspects of an institution of higher education are covered by Title IX, even those that are indirectly supported by federal funds. Therefore, Congress returned Title IX applicability to the "institutional approach" and effectively renewed jurisdiction of Title IX over college departments of physical education and athletics (Thro and Snow, 1993). The emergence of the Civil Rights Restoration Act also restored strength to the administrative enforcement of Title IX.

Institutions of higher education generally made gradual progress toward compliance with Title IX until 1992 when the Supreme Court made its next monumental ruling. The Court ruled in *Franklin v. Gwinnett County Public Schools* 112 S Ct 1028 (1992), that monetary damages could be collected by private parties in cases of intentional violations. For the first time in history, institutions of higher education were given real incentive to comply with Title IX. Before this decision, it was generally believed that courts could grant only equitable relief such as injunctions. However, after this ruling, there was the possibility that institutions found guilty of Title IX violations would not simply be ordered to add a women's team. Instead, the institution could be

ordered to pay monetary damages, often costing more than achieving compliance with Title IX in the first place

All of these changes over the past several years have left the current state of Title IX fairly complex Another attempt was made to clarify the guidelines in the interpretation of Title IX legislation and what Title IX compliance involves with the publication of the *Title IX Athletics Investigator s Manual* in 1990 by the OCR. This manual set out three main areas that are involved in Title IX compliance and that will be investigated by the OCR and the courts when ruling on whether or not an institution is complying with Title IX (Wong, 1994) Finally, a policy guidance clarification was issued on January 16, 1996, by the OCR This clarification provides specific factors that guide athletic administrators through an analysis of each part of the three-part test including examples to demonstrate how these factors will be considered (Office for Civil Rights, 1996)

Despite these clarifications there are still remaining ambiguities, and institutions on the whole have a long way to go to come into compliance Many differing opinions have emerged in the Title IX disputes The courts have been important in recent years in resolving these ambiguities and in enforcing the regulations Members of Congress have seized this controversial issue and are campaigning for major changes while the window of opportunity is present. College presidents, leaders of academic and economic reforms, need to be sensitive to the issues of gender equity The NCAA knows that changes must take place, but the governing body must be careful not to radically alter an economic structure that has already been weakened.

The football lobby has also been very active, led by coaches who fear that their programs will lose scholarships. They argue that if football were to lose its resources in this battle, the net effect would be to decrease revenues and overall opportunities for both sexes. The proponents of Title IX, primarily a group of female athletic officials and legal scholars, have gotten the attention of Congress and momentum appears to be on their side. Finally, the athletes are watching the progress being made but traditionally have had little direct involvement in the decision-making process with the exception of those athletes who have initiated lawsuits.

Compliance with Title IX

The Title IX regulation and policy interpretation (as well as later clarifications) divide athletic issues into three major categories to be analyzed for compliance. As mentioned in the previous section, although these two documents are similar, the policy interpretation goes into more detail in describing guidelines for compliance evaluation with regard to athletics. Therefore, the policy interpretation is the document primarily referenced by athletics administrators.

The three categories of the policy interpretation are:

I. Accommodation of Interests and Abilities (sports offerings)

II. Athletic Financial Assistance (scholarships)

III. Other Program Areas, including:

(1) equipment and supplies,
(2) scheduling of games and practice time,
(3) travel and per diem allowances,
(4) tutoring,
(5) coaching,

(6) locker rooms, practice and competitive facilities;
(7) medical and training facilities and services;
(8) housing and dining facilities and services;
(9) publicity,
(10) support services, and
(11) recruitment of student-athletes (44 Fed Reg 71,413 (1979))

The first category, accommodation of interests and abilities, is the analysis that focuses on the most serious and most common compliance problem in intercollegiate athletics today (Bonnette 1994) Secondly, this category provides the most tangible test of Title IX compliance and is the source of many of the most sweeping changes in intercollegiate athletics (Thro and Snow, 1993) Thirdly, cases subsequent to the passage of the Civil Rights Restoration Act have focussed on the analysis of the accommodation of interests and abilities area. For these reasons, the subsequent focus will be on this first category

Within this first major category for compliance, a three-part test is used to determine if interests and abilities have been adequately met. An institution need only meet one part of the three-part test in order to be in compliance with this category of Title IX. As stated in the policy interpretation, an institution may

(1) Provide participation opportunities for women and men that are substantially proportionate to their respective rates of enrollment as full-time undergraduate students, or

(2) Demonstrate a history and continuing practice of program expansion for the under represented sex, or

(3) Have fully and effectively accommodated the interests and abilities of the under represented sex (44 Fed.Reg. 71,413 (1979))

Compliance by the first method, participation opportunities proportionate to enrollment, is the simplest to analyze since this is easily determined by a mathematical calculation (Thro and Snow, 1993). The rates of participation of women and men in the athletics program should be substantially proportionate to their respective rates of enrollment as full time undergraduate students. For example, if women comprise 52% of the full-time undergraduate enrollment and men comprise 48%, then approximately 52% of the athletics participants should be women and 48% should be men. However, the OCR has maintained the position that substantial proportionality should be decided on a case-by-case basis.

There is definite merit to evaluating institutions on an individual basis. Nonetheless, this individual review generally occurs when an institution is thought to have serious compliance problems, while the vast majority of institutions are offered little guidance under the OCR's current reluctance to use a statistical test. Therefore, legal precedents are often referred to when concrete guidelines for this test of compliance are required. A difference of five percentage points between the percentage of women in the full-time undergraduate student population and the percentage of female varsity athletes has been the most common cutoff point in recent court decisions. Further, out-of-court settlements may suggest this statistical difference to be a fair and equitable guideline for achieving gender proportionality in intercollegiate athletics.

The key to compliance by method number two is to demonstrate a continuing practice of program expansion for the under represented sex. For example, if women are under represented, program expansion means the addition of women's teams. It does not

mean the unreasonable addition of walk-ons to current women's teams, cutting male participants to improve women's rate of participation, or improving benefits in other program areas such as equipment and supplies As with method number one, there is no set standard of continuing expansion that ensures compliance; however, the OCR has considered actions taken in the most recent three years as indicators of continuing program expansion (Semo and Bartos, 1994)

As for the third category, even in programs where one sex is significantly under represented, institutions may comply by offering every team for that sex in which there is (1) sufficient unmet interest to support an intercollegiate team, (2) sufficient ability to sustain an intercollegiate team, and (3) reasonable expectation of competition for the team (Office for Civil Rights, 1996) Determining compliance by this method involves determining whether there is any unmet interest on the part of the under represented sex, which is nearly always women (especially in programs offering football) Identifying unmet interest involves a review of on-campus and feeder programs.

On-campus programs include club sports, intramural sports, and elective physical education courses. Feeder programs include high-school programs, junior college programs, Amateur Athletic Union programs, and community, state and regional recreational programs in the institution's normal recruitment area. Compliance with this third method is unlikely if there is a sport not currently offered to the under represented sex for which there is sufficient competition and a club team, and/or significant participation at high schools in the institution's normal recruitment area, and/or substantial intramural participation (Bonnette, 1994)

Once again it is the first category that draws most of the attention Not only is it the easiest to analyze, but it is the only category of the three that tests Title IX equity in its purest sense The second category simply demonstrates that the institution is making progress toward Title IX compliance, while the third category has been estimated to be the case at a handful of institutions across the country at most (Semo and Bartos, 1994) Further, the first category, participation opportunities proportionate to enrollment, has been described by many as being the ultimate legal test of Title IX compliance (Bonnette, 1994) Therefore, the majority of discussion surrounding compliance with Title IX currently focusses on this first category

Gender Equity

A distinction should be made at this point between Title IX and gender equity Whereas compliance with Title IX is the law many individuals feel that gender equity is a moral concept that goes beyond this law

While gender equity is based on Title IX, its proponents hope that they can spur changes that go beyond this law and effect attitudinal changes that are not explicitly defined by the law Title IX has served as a catalyst for gender equity, however, enforcement has historically been ineffective The law has afforded a concept that has gained national attention, but proponents of gender equity hope that they can more effectively regulate compliance by convincing the public that gender equity is morally the right thing to do Simply put, ' gender equity entails implementing policies that make all aspects of a women's sports program--from administrative support to uniforms to decision-making--equal to those of the men's program " (Frankel, 1992)

The NCAA Gender-Equity Task Force has defined gender equity as an environment in which fair and equitable distribution of overall athletics opportunities, benefits and resources is available to women and men in which student-athletes, coaches and athletics administrators are not subject to gender-based discrimination (National Collegiate Athletic Association, 1993). An athletics program is gender equitable when either the men's or women's sports program would be pleased to accept as its own the overall program of the other gender The National Association of Collegiate Women Athletic Administrators (NACWAA) has stated a similar definition of gender equity Therefore, although the terms Title IX and gender equity are often used interchangeably, they really signify two very different things

Current State of Gender Proportionality

In order to analyze the current state of gender proportionality the NCAA conducted a special survey, the results of which were announced in March of 1992 Based on the responses of 646 member institutions regarding the 1990-91 academic year, participation rates in man's sports were found to be more than double that of women's sports even though enrollment at these schools was found to be close to a 50-50 ratio Although these numbers have improved slightly in recent years, institutions of higher education still have a long way to go toward achieving compliance with Title IX

Some strategies that institutions have used to increase the percentage of intercollegiate athletes who are female have been to expand the sizes of women's teams, to add women's teams, to drop men's teams and to cap squad sizes in men's sports (while the NCAA has scholarship limits for each sport, it has no limits on roster sizes)

The NCAA has also increased scholarship limits by one full scholarship in the sports of track and field (equivalency sport, i e , a scholarship may be divided by granting partial scholarships to a number of athletes), softball (equivalency sport), and gymnastics (head-count sport, i e , only full scholarships can be granted) However, increasing opportunities for women requires money

There has been talk of generating more revenue through such things as a national football playoff, donations from the U S Olympic Committee for nonrevenue sports, estate planning, female team merchandising, and state incentives There has also been talk of reducing existing costs through reductions in such areas as recruiting and travel However there is little evidence that institutions have wholeheartedly adopted these measures, therefore, the effectiveness of these practices is debatable It appears that these additional sources of revenue will most likely be difficult to come by for the majority of our nation's intercollegiate athletic programs, and maintaining competitiveness includes achieving proportionality while not potentially sacrificing the level of competition that is currently sustained in intercollegiate athletics

As Rick Hartzell, director of athletics at Bucknell University, states, "Opportunity right now is the watchword,"(Smolka, 1995) Supporters of women's athletics insist that increased opportunities for women are long overdue They feel that Title IX expresses the governmental interest in redressing past discrimination in athletics and in promoting opportunity (Heckman, 1992) Yet many schools have taken a dramatically different approach. As stated previously, Title IX does not legislate funding for women's sports, it simply calls for equal opportunity With budgets already in the red, many schools have

resorted to decreasing men's opportunities instead of increasing women's opportunities in an attempt to gain compliance with the law

Many schools find themselves in a predicament like that faced by the State University of New York (SUNY) Albany The school had intended to add women's crew, but determined that the costs were prohibitive. Without the funding to add 20-25 opportunities for women by starting a crew program, SUNY Albany instead cut 20-25 opportunities for men by scrapping its wrestling program (Smolka, 1995)

Football also tends to complicate matters At many schools, proportionality could be readily achieved were it not for football But with rosters that often top 100 players and with no equivalent sport for women football unbalances the number of athletic participation opportunities in favor of men

When asked if the University of Michigan, one of our nation's most prestigious institutions for athletics, could achieve gender equity without dropping any men's sports, Red Berenson, hockey coach and co-chair of UM's gender equity committee, said, "I think it's possible, whether or not it's practical, that's the question. Not dropping anything would be the ideal situation, but I don't know if that will be practical." (Beckett, 1994).

Perhaps William Kelly, a former swimmer at the University of Illinois when the men's swim team was cut, best summarizes this current state of affairs When interviewed, Kelly told the newspapers, "Taking away opportunities from men doesn't necessarily improve opportunities for women Taking away from us might change the

percentages, but it doesn't change the actual situation for women " (Blum, 1993, p A34) Many interest groups suggest that other solutions to the Title IX debate must be sought

Recent Title IX Litigation

The degree of gender proportionality present at an institution of higher education has become the dominant criterion in achieving compliance with Title IX In order to be found in compliance with this criterion substantial proportionality must be attained The OCR has been reluctant to statistically define substantial proportionality because the enforcement agency feels that this should be decided on a case-by-case basis. However, the current trend in higher education has been a toward stricter analysis of Title IX compliance with greater penalties for non-compliance (Curtis, 1995), therefore, many administrators would like to have more concrete guidance detailing what they must do to be found in compliance

Legal precedents provide a tangible set of guidelines for compliance with the law Legal decisions help provide insight into how the specifics of compliance with Title IX should and will be determined as well as clarify the burden of proof that is required and the type of relief which the courts may award The cases that follow offer evidence that a gender proportionality difference of five percentage points has been the most common cutoff point for an institution to be ruled substantially proportionate

Cohen v. Brown University

In the most widely publicized Title IX case in recent years, the U S Court of Appeals for the First Circuit unanimously ruled in *Cohen v Brown University*, 991 F.2d 888 (1st Cir. 1993) that in downgrading its women's volleyball and gymnastics teams

from varsity status to club status, Brown was not fulfilling its obligation to accommodate the interests and abilities of its female student-athletes Brown University was required to reinstate its women's gymnastics and volleyball teams to varsity status. This decision served as the first appellate court opinion to interpret the substantive requirements of gender proportionality

On the first prong of the three-prong test, Circuit Judge Bruce Selya wrote that if substantial proportionality is met with respect to a particular gender, the interests and abilities of that gender will be presumed to have been met and the institution will be found to be in compliance with Title IX This was not the case at Brown since the male/female participation ratio remained at approximately 63 percent/37 percent (two men's sports were also downgraded to club status) while the student body was about 52 percent male and 48 percent female. Prongs two and three of the three-part test were also found to not have been met.

The two men's sports and two women's sports were downgraded to save $77,000 however Brown ended up paying expert witnesses over $100,000 (Herwig, 1995, p.3C) It is obvious from this example how important a ruling of substantial proportionality can be to an institution, and how costly it can be for an institution to be found not substantially proportionate and therefore not in compliance with Title IX

Beth Pederson v. Louisiana State University

In this case decided on January 12, 1996, it became clear just how important a status of substantial proportionality can be to an athletic program. The federal judge ruling on this case stated her qualms with the current methods of determining compliance

with Title IX (Blum, 1996, p A33) However, despite the alleged shortfalls of the gender proportionality criterion, the judge stated that she was forced to rule that LSU was in violation of Title IX because the athletic opportunities were found to be not substantially proportionate to the rates of undergraduate enrollment, and LSU was therefore not in compliance with the law

The five female athletes were granted only legal fees because the violation was ruled unintentional ("Purdue coach," 1996) However, the university was found to have a ' remarkably outdated view of athletics" ("ESPN U S 500 hopes,' 1996) and was given 20 days to remedy the violation Further, it is felt that this ruling will establish the basis for viewing other universities in the Southeast Conference and Atlantic Coast Conference as "high profile ready targets for Title IX enforcement actions" ("Bias found at L S U," 1996) Therefore, despite the expressed concerns with the current system of determining compliance this case helps to set a precedent for courts continuing to rule against an institution that is found to be not substantially proportionate unless the law is amended through a Supreme Court ruling or by Congress

Roberts v. Colorado State Bd of Agriculture

In the case of *Roberts v Colorado State Bd of Agriculture* 998 F.2d 824 (10th Cir 1993), *cert denied*, 114 S Ct 580 (1993), the U S Court of Appeals found that CSU's elimination of the women's softball team was in violation of Title IX and affirmed the lower court s ruling that ordered CSU to reinstate the team to varsity status. This case was filed by members of the women's varsity softball team after CSU announced it was dropping softball (18 participants), as well as men s baseball (55 team members) The

lower court applied the three part test in the OCR policy interpretation, as in *Brown*, and found that Colorado State had violated Title IX by failing to establish substantial proportionality

This case helped to define substantial proportionality The Court of Appeals found that there was a 10 5 percent disparity between the female undergraduate enrollment and athletics participation by female students (48 2 to 37 7) and that this percentage did not meet the test of substantial proportionality The precedent was established in the 10th circuit that a gender proportionality discrepancy of 10 percent is too large and thet institutions having such a discrepancy will most likely be found in violation of the law Although the precedent was only established for this particular circuit, the ruling will most likely be considered by judges ruling on similar cases in other districts

Favia v. Indiana University of Pennsylvania

When faced with budget problems, Indiana University of Pennsylvania (IUP) eliminated the women's gymnastics and field hockey teams and the men s tennis and soccer teams. At the time, 55 percent of the student population was female, but only 37 percent of the student-athletes were female. After the two sports were eliminated, the percentage of female student-athletes dropped to 36 percent In *Favia v Indiana University of Pennsylvania*, 812 F Supp 578 (W.D Pa. 1993), the members of the two women's teams and the field hockey coach filed a class action suit against the university for violation of Title IX

The U.S. District Court for the Western District of Pennsylvania undertook an analysis using the same tests as in the previously discussed cases and confirmed the *Brown* and *Colorado State* rulings. The court concluded with respect to substantial proportionality that the 19 percent difference between the percentage of females in the undergraduate student population and the percentage of females in the varsity athlete composition did not meet the test of substantial proportionality. As for the second prong, the court determined that the progress that had been made in the 1980s had been negated by the cutbacks in the 1990s. The court also found that IUP's efforts were lacking with respect to the third prong, that of full and effective accommodation (812 F. Supp. 578 (W.D. Pa. 1993)).

It should be noted that this case also established some precedents within the jurisdiction through the court's rulings on IUP's defenses. First, the court ruled that financial concerns did not justify the taken actions--not having the necessary funding to continue a program did not excuse an institution from compliance with Title IX. Further, the court ruled that the lack of an NCAA Division III championship was also not reason enough to eliminate these women's sports. Because the university had not met any one of these three prongs, IUP's defenses proved invalid as far as Title IX was concerned.

Kelly v. Board of Trustees of the University of Illinois

In the only federal appellate decision to speak on the issue of the elimination of men's teams, *Kelly v. Board of Trustees of the University of Illinois*, 35 F.3d 265 (7th Cir. 1994), the U.S. Court of Appeals for the Seventh Circuit ruled that the University of Illinois--Urbana Champaign did not violate Title IX when it decided to drop its men's

swimming team while maintaining its women's varsity swimming program The court ruled that the university could drop the men's program without violating Title IX because substantial proportionality existed with respect to men's athletics.

Prior to the planned cuts, the school's male student-athletes comprised 76 6 percent of the total number of student-athletes while men comprised only 56 percent of the total university student body population According to the court, men would still be over represented after the elimination of the men's swimming program, therefore, the court ruled that male athletic interests were presumed to have been met, and that the University of Illinois could eliminate its men's swimming program without violating Title IX.

Title IX Settlements

With the stricter, case-by-case analysis of Title IX compliance that has now become the norm many institutions faced with lawsuits have realized that the ruling may not be in their favor Knowing this, these institutions have often opted to settle out of court hoping the severity of the outcome will be less extreme for their respective institutions Since the following cases were settled out of court, there can be no way of knowing what the final court ruling would have been in each case However, a review of these out-of-court settlements is warranted because they provide additional perspectives on the Title IX issues facing institutions of higher education.

In *Sanders v University of Texas at Austin,* Civil No A-92-CA-405 (W D Tex Oct 24, 1993), female students filed a Title IX class action suit alleging that Texas had failed to accommodate fully and effectively the interests and abilities of its female

students. Due to this lack of gender proportionality, the plaintiffs were asking for the addition of four new women s varsity sports. To settle the lawsuit, the university agreed to increase the women's percentage of athletic participation from 23 percent to 44 percent within three years which would approach the 47 percent rate of female undergraduate enrollment. To implement this goal, the university added women's soccer in the 1993 94 school year and varsity softball in 1995-96 school year (Semo and Bartos, 1994).

In *Schuck v Cornell* Civil No 93-CV-756 FJS-GJD (N D N Y Dec 8, 1993), the parties settled out of court with the university agreeing to restore the women's gymnastics and fencing teams Cornell had terminated these sports along with the men s corresponding sports and freshman football in 1992 In the settlement, Cornell agreed not to take actions that would " adversely affect other women's teams " but it reserved the right to make program changes within the boundaries of the law (Semo and Bartos, 1994)

In *Kiechel v Auburn University*, Civil No 93-V-474-E (M D Ala. July 19, 1993), females on the women's club soccer team instituted a class action suit against Auburn to elevate the team to varsity status. In the settlement, Auburn agreed to the elevation of the soccer program and to take additional actions such as committing $400,000 to the team for operating expenses in the first two years, constructing permanent playing fields for use by the next year, phasing-in scholarships at a predetermined rate, paying $60,000 in damages to the plaintiffs, and paying the plaintiffs' attorneys fees and expenses (Blum, 1993)

Lastly, Virginia Polytechnic Institute and State University (Virginia Tech) also agreed to a proposed settlement of a sex-bias lawsuit filed against the school in 1994 When the 12 women who played on club teams filed the class action lawsuit, they asked Virginia Tech to add women's field hockey, softball, lacrosse, and crew as varsity sports. However, Virginia Tech only agreed to add two sports to settle the suit. The school added women's lacrosse in the spring of 1995 and added softball for the 1995-96 academic year By adding these two sports, the university will have increased the proportion of women participating in varsity sports to within three percentage points of the female student population by the 1996-97 school year The court did approve this difference to be substantially proportional, therefore, the first prong of the test will be satisfied and Virginia Tech will not have to add field hockey nor crew to further increase its female athlete percentages (Blum, 1995)

Benefits of Increased Athletic Participation

"Succeed in sport, succeed in life.' This motto of the Florida Study Commission on Women's and Girls' Participation in Athletics and Extracurricular Activities symbolizes the American belief that sports are the training ground for life. Athletics is the arena where the youth of our nation learn to work hard and sacrifice, perform with a team and overcome defeat to reach their goals (Florida Study Commission, 1993)

It has been proven that athletes tend to excel in emotional stability, conscientiousness, self-control, self-assurance, and other important personality characteristics A direct link has also been established between athletic participation and student success rate in the classroom In addition, athletic participation encourages

teamwork and goal attainment while at the same time teaches many valuable lessons that cannot be learned through classes alone And all of these qualities tend to exhibit themselves long after participation in sports has ended.

Perhaps the essence of sport is best characterized in a statement by the Knight Foundation Commission on Intercollegiate Athletics

> "Games and sports are educational in the best sense of that word because they teach the participant and the observer new truths about testing oneself and others about the enduring values of challenge and response, about teamwork, discipline and perseverance. Above all, intercollegiate contests--at any level of skill--drive home a fundamental lesson Goals worth achieving will be attained only through effort, hard work and sacrifice, and sometimes even these will not be enough to overcome the obstacles life places in our path " (Knight Foundation 1991)

Many interest groups believe that thousands of men and women in the United States are stronger adults because of the challenges they mastered as young athletes Therefore, coming into compliance with Title IX by increasing athletic opportunities for women is believed by many to be an excellent investment in the youth of our nation.

The National Collegiate Athletic Association

The National Collegiate Athletic Association (NCAA) is the principal association governing intercollegiate sports programs in the United States It is also the organization through which the nation's colleges and universities speak and act on athletics matters at the national level Gender equity has been one of these issues of national concern addressed by the NCAA in recent years

It was the injuries and deaths caused by football in the early 1900s that spurred the formation of the NCAA. Institutions realized that football had to be reformed for the sport to survive Leading the reform movement was President Theodore Roosevelt who

brought college leaders to the White House for two conferences in 1905. Later that same year, the Intercollegiate Athletic Association of the United States (IAAUS) was founded by 62 members and was officially constituted on March 31, 1906.

The name of the Association was changed from the IAAUS to the NCAA in 1910. For the first several years the NCAA was a discussion group and rules-making body. However, in 1921 the first NCAA national championship was held, and from that point forward the NCAA began to sponsor more and more national championships, continuously expanding its jurisdiction over the intercollegiate sports world.

A series of crises brought the NCAA to a crossroads after World War II. The "Sanity Code"—adopted to establish guidelines for recruiting and financial aid—failed to curb abuses involving student-athletes. The complexity and scope of these problems and the growth in membership and championships demonstrated the increasing need for full-time professional leadership (National Collegiate Athletic Association, 1994). Therefore, in 1951 Walter Byers was named executive director, and in 1952 a national headquarters was established in Kansas City, Missouri.

The NCAA's membership was divided into three legislative and competitive divisions in 1973. In 1978, Division I members voted to create subdivisions I-A and I-AA in football. In 1980, female sports entered the jurisdiction of the NCAA with the establishment of 10 championships for women in Divisions II and III for the 1981-82 academic year. One year later, an extensive governance plan was adopted which included women's athletics programs, services, and representation, and the women's championships program was expanded with the addition of 19 events. Lastly, in 1985 the

Presidents' Commission took decisive actions to strengthen the Association's compliance and enforcement efforts (National Collegiate Athletic Association, 1994)

Walter Byers retired in 1987 after 36 years as the executive director He was replaced by Richard Schultz who resigned in 1993 The NCAA currently staffs more than 200 employees based in Overland Park, Kansas and is led by Executive Director Cedric Dempsey Seventy-nine championships are sponsored in 21 sports for member institutions with more than 22,000 men and women student-athletes competing annually

The stated mission of the NCAA is to maintain intercollegiate athletics as an integral part of the educational program and the athlete as an integral part of the student body (National Collegiate Athletic Association, 1994) The Association also stands for good conduct in intercollegiate athletics and serves as the colleges' national athletics accrediting agency The National Collegiate Athletic Association's purposes are

> To initiate, stimulate and improve intercollegiate athletics programs for student-athletes and to promote and develop educational leadership, physical fitness athletics excellence and athletics participation as a recreational pursuit, to uphold the principle of institutional control of, and responsibility for, all intercollegiate sports in conformity with the constitution and bylaws of the Association, to encourage its members to adopt eligibility rules to comply with satisfactory standards of scholarship sportsmanship and amateurism to formulate, copyright and publish rules of play governing intercollegiate athletics, to preserve intercollegiate records; to supervise the conduct of, and to establish eligibility standards for, regional and national athletics events under the auspices of the Association, to legislate, through the bylaws or by resolutions of a Convention, upon any subject of general concern to the members related to the administration of intercollegiate athletics, and to study in general all phases of competitive intercollegiate athletics and establish standards whereby the colleges and universities of the United States can maintain their athletics programs on a high level (National Collegiate Athletic Association, 1994)

The NCAA has grown dramatically in the past 40 years with more than 750 new members since 1950. It currently has a membership of more than 1,150 institutions, conferences, organizations, and individuals devoted to the sound administration of intercollegiate athletics. All sizes and types of institutions, from large state universities to small private and church-affiliated colleges, comprise the active membership. In addition to these active members, the Association provides for member conferences, affiliated members (coaches associations and other related groups), provisional members (institutions fulfilling a three-year requirement before eligibility for active membership), and corresponding members (institutions, conferences, and nonprofit organizations not qualifying for the other categories) (National Collegiate Athletic Association, 1994)

Any college or university may be elected to active membership if it is accredited by the regional academic accrediting agency of its region, maintains at least four intercollegiate sports for men and four for women (one in each of the three traditional seasons), unless the institution conducts athletics programs for only one sex, complies with all NCAA legislation (as certified by the chief executive officer) dealing with financial aid, recruiting, playing seasons, postseason competition and other areas of administration, and agrees to cooperate fully with the NCAA enforcement program and to respect penalties imposed by that program (National Collegiate Athletic Association, 1994)

Active members determine which of the three membership divisions is most appropriate for the new institution's programs, based on the school's ability to meet criteria established by the divisions. Generally, the differences in classifications include

sports sponsorship minimum criteria, football and basketball scheduling requirements, academic and eligibility standards, and financial aid limitations In addition Division I-A members are required to meet minimum paid football attendance criteria (National Collegiate Athletic Association, 1994) The current definitions of the divisions are as follows (Fulks, 1994)

Division I-A This group includes those institutions that play at least 60 percent of their regular-season football games against other Division I-A institutions All but four basketball games (both men s and women s programs) must be against other Division I teams Seven men s and seven women's, or alternatively six men's and eight women's sports must be sponsored. There are also requirements for attendance, scheduling and financial aid

Division I-AA These institutions must play more than 50 percent of their regular-season football games against Division I-A or I-AA institutions All but four basketball games (both men's and women's programs) must be against other Division I teams Seven men's and seven women s, or alternatively six men's and eight women's sports must be sponsored There are also requiremeots for scheduling and financial aid

Division I-AAA This group of institutions either do not sponsor football or choose to classify their football programs in either Division II or III Other requirements are identical to those of Divisions I-A and I-AA

Division II For these institutions, at least 50 percent of all football games must be played against Division I-A, I-AA or II teams At least 50 percent of all basketball games (both men's and women's programs) must be played against Division I or II members At least four men s and four women s sports must be sponsored There are no attendance, scheduling or financial aid requirements

Division III For these institutions, more than 50 percent of all football games must be played against Division III teams or nonmembers who grant financial aid on need only More than 50 percent of all men's basketball games must be against Division III teams or nonmembers who grant financial aid on need only At least four men's and four women's sports must be sponsored There are no attendance, scheduling or financial aid requirements

It should be noted that both Division II and Division III have separate "without football" classifications for institutions that meet the requirements of that respective division but do not sponsor football. The classifications of Division II Without Football and Division III Without Football bring the total number of NCAA classifications to seven.

Finance of Intercollegiate Athletic Programs

In order to accomplish educational and social objectives, intercollegiate athletics programs require significant commitments of monetary resources (Raiborn, 1990). However, most institutions are currently faced with flat revenues and spiraling expenses. This means that most of our nation's institutions have fewer real dollars with which to work each year. For example, at the University of Michigan, about 25 percent of the athletic department's budget increases every time tuition is raised, which is almost annually, because the department must pay the university for its athletic scholarships (Beckett, 1994).

Complicating matters are institutions' efforts toward compliance with Title IX. Making women's athletic opportunities equal to men's would be easy if schools had enough money to simply add three or four new women's sports (Beckett, 1994). However, a review of a recent NCAA survey on financial trends in intercollegiate athletics makes it apparent that things are not that easy. In fact, the survey determined that sports programs continue to spend more money than they make.

In fiscal year 1993, only Division I-A had total revenues exceeding total expenses--Division I-A's profit was $660,000. Division I-AA through Division III all reported deficits in 1993 with some divisions exceeding $600,000 in the red. Further

even Division I lost money in 1993 if institutional support of the athletic program is excluded from the revenue totals (since this is really an expense of the institution as a whole) With institutional support excluded, Division I lost $174,000 while other divisions lost up to ten times this amount (Fulks, 1994) This means that even many of the institutions that play big time sports would have run a deficit in their athletics budgets without subsidies from their respective universities

Therefore, on the whole institutions are already losing money and are a long way from compliance with Title IX As mentioned previously, gender proportionality is arguably the best indicator of compliance, however, the average numbers of varsity athletes per NCAA institution were 202 males and 106 females in 1993 with the biggest discrepancy found in Division I posting averages of 312 male and 128 female varsity athletes per institution despite student body populations that on average were close to 50 percent female (Fulks, 1994) And budgetary figures for compliance can be astronomical For example, the University of Michigan has projected that gender equity could cost the institution anywhere from $1-$2 million a year (Beckett, 1994)

For these reasons, much of the Title IX argument has focused on funding and how institutions can implement gender equity with diminishing budgets Athletics administrators must determine if existing resources are allocated in the most efficient and cost effective manner possible or if changes can be made that could potentially increase the number of opportunities for women under current budgetary constraints There is no question that athletics administrators are currently faced with some very difficult

circumstances, however these circumstances must be addressed before their respective institutions are found in violation of the law

Sources of Revenue and Expenses in Intercollegiate Athletics

As is the case with most financial information, comparisons of financial aspects of athletics programs are often difficult if not impossible due to the uniqueness of reporting systems and the confidentiality of this type of information The NCAA addressed this problem beginning in 1969 by sending out surveys requesting financial information in standardized form from its member institutions every couple of years Therefore, the sources of revenue and expenses in intercollegiate athletics addressed below were based on the financial information obtained by the NCAA

The term revenue as it applies to non-profit organizations such as intercollegiate athletics programs has been defined as a financial measure of gross income earned and all other additions to resources that do not increase liabilities, do not represent the recovery of expenditures, and do not represent contributions to capital (Raiborn 1990) In other words, the term as it applies to intercollegiate athletics encompasses more than the traditional receipt of funds from the sale of goods or services Revenues of an athletics program not only include such things as ticket sales for athletic events, guarantees and options received by an institution from opposing teams under game contracts, student activity fees, broadcasting fees from television and radio, and income from investments, but revenues also include other receipts that are intended to support operations of the program such as alumni contributions and governmental and institutional support

For NCAA reporting purposes, sources of revenue of member institutions were divided into eight categories: ticket sales, postseason compensation, student activity fees, guarantees and options, alumni contributions, direct government support, institutional support, and other. These categories were further subdivided in instances where a division lead to an increased understanding of the exact source of that revenue. For instance, the first category, ticket sales, was divided into sales to the public, faculty, and staff, and sales to the students. Institutions generally either charged a reduced rate to students or did not charge students at all, therefore, it was often helpful to have this figure reported separately.

The second category, postseason compensation, was broken down into six subdivisions: compensation from bowl games, compensation from tournaments, postseason television compensation, NCAA distributions, conference distributions, and other. These sources of revenue were generally a significant percentage of total revenue only at Division I-A institutions.

The last revenue category that was subdivided was category eight, other. This category accounted for all sources of revenue not incorporated in the first seven categories. Subdivisions of this category were compensation from concessions, regular-season radio/television revenue, revenue from special events, program sales/advertising revenue, signage/sponsorship revenue, revenue earned through sports camps, and miscellaneous revenue. These categories were meant to be all-inclusive so that all revenues of an intercollegiate athletics program should have been placed in one of these

eight categories--the total of the eight categories should have equalled the revenue grand total for the program

Operating expenses for an athletics program, on the other hand have been defined as the costs incurred for salaries, grants-in-aid, travel, equipment and supplies, contract game settlements paid to opposing teams, and other disbursements required for the current operation of the athletics program (Raiborn, 1990) As with sources of revenue, all expenses incurred by an intercollegiate athletics program should have been placed in clearly-defined categories to assure uniformity of responses Ten categories of operating expenses as well as two other categories of expenditures were provided by the NCAA

The ten categories of operating expenses were grants-in-aid, guarantees and options, salaries/wages/fringes, team travel, scouting and recruiting, equipment/uniforms/supplies, fund-raising, insurance, contract services, and other The two categories of general expenditures were debt service and capital expenditures Each category was further subdivided into men's expenses, women's expenses and administrative expenses to allow for more accurate comparisons

Other Studies Using Mathematical Models and Analysis of Variance Techniques

Because of their dual theoretical and applied nature, mathematical (predictive) models form the basis for thinking about as well as solving many different types of problems in a variety of disciplines and settings (Chung, 1985) Two previous studies that have formulated mathematical models to describe and/or predict phenomena in intercollegiate athletics are presented Further, an abundance of mathematical models have been developed to explain educational phenomena. Several of these studies are also

presented with the aim of displaying the mathematical model's usefulness in the solution of a broad range of educational problems including those of intercollegiate athletics

Hicks (1991) created a mathematical model to study the effects of selected predictor variables of academic achievement on the academic performance of freshman athletes and nonathletes who matriculated into the College of St. Francis during the 1986-87, 1987-88, 1988-89, and 1989-90 academic years. The dependent variable was cumulative college GPA while the independent variables were high school GPA, ACT composite score, gender, participation in sports, housing status, and high school location. High school GPA was found to be the single most effective predictor of freshmen cumulative college GPA. Further, high school GPA, ACT composite score, and gender attributed for most of the explained variance. Participation in sports, housing status, and high school location were found insignificant in the prediction of cumulative college GPA.

Sterrett (1984) used a mathematical model to describe the relationships between athletic department revenue (dependent variable) and the success of revenue sports, the type of institutional support granted to an athletic department, the institutional location, and a variable representing whether or not the athletic department employed a development officer to aid in the raising of revenues (independent variables). The conclusions drawn from this study included the following: (1) the existence of a development and/or promotions officer for athletics was significantly related to higher levels of athletics revenues, however, the direction of causality could not be defined and a significant amount of the observed variance in revenues remained unexplained, (2)

success of athletic programs and type of institutional support were important elements in predicting athletic department revenues in some samples tested, and (3) institutional location was not significantly associated with revenue levels in any samples tested

Expanding into a general educational context, a recent study by Anderson (1992) created a mathematical model using current economic research on resource allocation to define educational "efficiency" and to characterize those aspects of urban and rural schools which influence efficiency in education. The mathematical model identified higher salaries and smaller classes as resource allocation patterns that were negatively related to efficiency for both urban and rural schools. Other characteristics of resource allocation including expenditure patterns, teacher experience and education, quality of the library, and the ratio of guidance counselors to students were found to affect efficiency differently at the urban and rural schools.

In another study on educational efficiency, Kim (1992) empirically tested a mathematical model using as data the 1990 National Assessment of Educational Progress (NAEP) Trial State Assessments (TSA). The purpose of the study was to identify the educational factors that had significant impacts on student achievement and to examine interrelationships among the educational factors as well as relative relationships of the factors with student learning outcomes through a mathematical model using eighth grade mathematics achievement as the dependent variable. The results of the mathematical model indicated that student characteristics and student behavior had the greatest impact on student achievement.

In a study by Huang (1993), the determinants of institutional effectiveness of senior high schools were evaluated to identify the most significant factors associated with school productivity as measured by student achievement and cycle costs in the Shenzhen Special Economic Zone of China. This study used a mathematical model that described the relationship between indicators of inputs from the school and families and indicators of school processes and outputs. The study found that all the SES related factors, including father's education, mother's education, father's occupation, mother's occupation, and parental out-of-pocket expenditures were positively associated with student achievement. In addition, school expenditures, teacher qualifications, teacher reliance on textbooks in instruction, teacher use of produced materials, and student time devoted to learning also were positively related to student achievement.

Shugoll (1980) looked at the equality and productivity of state aid to elementary and secondary education through the use of a mathematical model. The model featured independent variables measuring student's family environment and community environment, school service conditions, and local, state, and federal educational revenues per pupil. The model was run multiple times--for each state and then for the country as a whole. The study determined that the aid programs in most states were equalizing but that state aid increased educational output in only slightly more than one half of the states. Therefore, the study found no tradeoff between the equality and productivity of state aid programs.

A mathematical model was developed to study learning by Lopez in 1994. This model formulated student effort as the dependent variable and nine capital variables

representing the pre-labor market environment as independent variables This study created a theoretical framework that was used to determine how the pre-labor market environment affects the type of education Latino and Anglo students obtain The mathematical model showed that the social capital variables are important in explaining whether the student ends up in an academic college-bound curriculum or in a general/vocational one

At the higher education level, a study by Frisbee (1981) addressed the question of whether altering the quantities or types of educational services provided by institutions to their students or altering the way in which students allocated their time had an effect on academic performance as measured by course grade The study employed regression analysis to estimate a mathematical model for student course grade. The study determined that the academic performance of students in the College of Human Ecology at Cornell University was effected by the way in which total course contact hours were allocated between lectures, recitations, and laboratories, by the number of examinations given by the number of problem sets laboratory reports and term papers assigned, and by the use of required texts The analysis also indicated that student decision to attend class and allocate time to private study played a significant role in academic performance at the university

In a study by Ahumada (1983), a mathematical model was utilized to analyze differences in instructional costs across academic units at a Latin American university Three measures of instructional costs were regressed on a series of independent variables that were hypothesized to influence instructional costs Differences in costs were found

to be largely due to differences in student-faculty ratios, average class sizes, total number of courses taught, and clerical salaries

Lastly, a study by Rebne (1988) formulated a general mathematical model of determinants of individual productivity in the context of higher education and the research function The model included the three general sources of productivity variance identified by Human Resource Management theorists (1) individual attributes and performance-related attitudes, (2) occupational characteristics, and (3) institutional context (26 variables) The study's central purpose was to determine the relative importance of these sets of factors as predictors of productivity It was found that, for most occupational groups, situational factors are more important determinants of productivity than individual differences

Analysis of variance (ANOVA) techniques have also been used quite extensively to study relationships between variables in intercollegiate athletics or in the broader context of higher education. Two examples of the use of ANOVAs to test for significant difference(s) between two or more groups and the subsequent use of post hoc tests to determine where these significant difference(s) occur follow

Garrett (1985) used analysis of variance techniques to determine college and university administrators' attitudes toward the values of intercollegiate athletics A questionnaire of 31 Likert items contained subscales designed to make comparisons between and among various subgroups of administrators with respect to their general attitudes toward intercollegiate athletics Analysis of variance and subsequent Scheffe post hoc tests were used to test the null hypothesis This study concluded (1) present-

day administrators at NCAA institutions possess an overall favorable attitude toward the values of intercollegiate athletics, (2) Division I and Division II athletic directors possess a significantly more favorable attitude toward the values of intercollegiate athletics than Division III athletic directors, (3) there is no significant difference in the overall attitudes that Division I, II, and III presidents have toward the values of intercollegiate athletics, and (4) there is no significant difference in the overall attitudes that Division I, II, and III faculty athletic representatives have toward the values of intercollegiate athletics

Secondly, Branham (1994) used analysis of variance techniques to study the level of support leaders in intercollegiate athletics had for the 30 recommendations of the Knight Commission A 5 x 2 x 5 ANOVA was used to test for main effect differences between types of professionals (i.e., coaches (three types), athletic directors, and faculty athletic representatives), divisional level of their respective institutions (Divisions IA and IAA only), and components of the Knight Commission model (five components such as academic integrity, financial integrity, and independent certification) Tukey HSD post hoc tests were utilized when main effects were found to be significant. Branham found that the greatest overall support was given to the philosophical principle component of the Knight Commission recommendations, with the lowest support given to the academic integrity component. Faculty athletic representatives and athletic directors were found to favor all components of the recommendations more than the three coaching groups

In conclusion, the use of mathematical models and analysis of variance techniques to test questions similar to the questions posed in this study have been well documented in the literature For this reason, mathematical models and analysis of variance

techniques were believed to form a well grounded methodology for testing the questions posed in this study

Chapter Summary

Title IX has brought about a major transformation in intercollegiate athletics The courts are continuing to focus on the three-prong test from the OCR policy interpretation examining gender proportionality at our nation's institutions of higher education as the predominant criterion in evaluating compliance with this law

Athletics administrators must be aware of the enormous impact of Title IX and must prepare their institutions to take the necessary steps toward compliance with this law Failure to follow the guidelines of Title IX will place an institution in a position to become involved in litigation that could very likely be much more costly than the funding needed to gain compliance in the first place. As Beckett (1994) commented when questioned regarding Title IX, "Let's face it, we're in a changing world. Things don't stay the same forever We have to adapt to that change."

CHAPTER 3
PROCEDURES

Introduction

The purpose of this study was to develop and analyze mathematical models to explain the relationships among resource allocation patterns and gender proportionality in intercollegiate athletics using two different frames of reference. A further purpose was to study the relationships between individual resource allocation variables believed to play a significant role in achieving gender proportionality and three categories of gender proportionality, three divisional levels and football status currently found at NCAA member institutions. Mathematical models were developed through the use of multiple regression while the relationships between individual resource allocation variables and gender proportionality categories, divisional levels, and football status were examined through the use of analysis of variance techniques. Specific details of these procedures will be developed in the subsequent sections.

Selection of Data

The overarching goal of the study was to aid athletic administrators in the reexamination of resource allocation patterns by providing guidelines for the reallocation of program funds thereby enabling institutions to achieve compliance without sacrificing competitiveness or fiscal soundness. In order to achieve this goal, an accurate

representation of financial data and gender proportionality information in intercollegiate athletics programs was required.

As is the case with most financial information, comparisons of financial aspects of athletics programs are often difficult if not impossible due to the uniqueness of reporting systems and the confidentiality of this type of information. The NCAA addressed this problem beginning in 1969 by requesting financial information in standardized form from its member institutions every couple of years through surveys. Since these NCAA financial surveys represented the largest source of standardized financial information on intercollegiate athletic programs, these surveys were viewed as the most accurate and logical source of financial data for the purposes of this study.

Both sources of revenue and objects of expenditure (resource allocation patterns) were considered as potential variable sets. Resource allocation patterns were chosen as the preferred variables of study for two reasons: first, it has been determined that an extremely high correlation exists between sources of revenue and resource allocation patterns, therefore, results should be very similar using either variable set. Secondly, administrators have greater inherent control over resource allocation variables than they do over revenue variables, making it much more likely that athletic administrators could alter their institution's resource allocation patterns according to the recommendations of this study than they could alter their institution's sources of revenue. Therefore, the mathematical models as well as the individual financial/gender proportionality relationships were developed subject to the resource allocation categories defined by the NCAA.

With regards to gender proportionality female participation rates in intercollegiate athletics and the percentage of females in full-time undergraduate student populations were necessary to determine this proportionality Since the gender proportionality data had to be tied to the resource allocation data used in this study to make these analyses possible, these two percentages were obtained from the NCAA for each institution contributing the survey of financial information through a survey

Lastly, the NCAA classification (divisional level) and the football status (whether or not the institution sponsored football as one of its varsity sports) of each institution contributing data were obtained from the pertinent questions on the financial surveys This information was necessary in order to test for significant differences between divisional levels and between football sponsoring and non-sponsoring institutions on resource allocation patterns.

Population and Sampling

As mentioned above, the population of this study was composed of the nearly 900 member institutions of the NCAA in all levels of classification (divisional levels) From this population, the sample was obtained through volunteer sampling The sampling was volunteer because although this information was requested of all institutions in the population (the membership of the NCAA), the administrators at those institutions had the choice of whether they volunteered the financial information or not.

It should be mentioned that this volunteer sampling could potentially have created a bias in the data that posed a threat to the external validity or generalizability of these results External validity refers to the approximate validity with which the researcher can

infer that the presumed causal relationship can be generalized to and across alternate measures of the cause and effect and across different types of persons, settings, and times (Cook & Campbell, 1979, p. 37). In other words, external validity is a concept that refers to how well sample findings relate back to the population. The selection and use of good representative samples greatly aids the generalizability and thus the inferences the researcher can draw or the interpretations the researcher can make. As will be shown below, only 55 percent of all institutions returned useable questionnaire surveys. therefore, there existed the possibility that the results of this study were not representative of the population as a whole. For example, if institutions in better financial condition or those with better gender proportionality rates were more likely to complete the survey, the results may not have been generalizable to institutions who chose not to participate and were not as financially sound and gender proportionate.

A random sampling of the population could have eliminated this threat to external validity. Unfortunately, the nature of the survey did not allow for this type of design. Therefore, it should be kept in mind that certain biases may have existed in the results of this study.

Instrumentation

A questionnaire survey requesting revenue and expense information for the 1992-93 fiscal year was sent by the NCAA to all 892 of its member institutions in the Fall of 1993. Similar financial surveys were also used to collect data concerning sources of revenue and objects of expenditures in 1969, 1979, 1981, 1985, and 1989. Since the 1993 financial survey (fiscal year 1992-93) represented the most recent financial

information available, this questionnaire survey was chosen as the instrument of study. It should be noted that the design of the study incorporated information from only one fiscal year due to the fact that the format of the instrument was changed in the 1993 survey from previous formats. This lack of consistency between questionnaire surveys prevented data from different fiscal years from being compared in the subsequent analyses.

In the 1993 financial survey, it was clearly stated that all sources of revenue as well as all expenses were to be placed in a category--in other words, the NCAA attempted to ensure that all monies coming into or going out of each athletic program were taken into account. Further, the 20 categories of potential revenues as well as the 12 categories of potential expenses were thorough and specific enough that they should have ensured a high degree of reporting consistency between institutions. A sample of this NCAA financial survey has been provided in the appendix.

As mentioned above, in addition to the financial information of intercollegiate athletics programs, the study also required information on the female participation rate in intercollegiate athletics, the percentage of females in the undergraduate student population, the classification or divisional level, and the football status of each institution contributing financial information to the study. The "Organization and Activity Data" section of the questionnaire survey requested the number of male and female varsity athletes participating in intercollegiate athletics (Section II, question two). Therefore, the percentage of the total number of varsity athletes who were female in the fiscal year of this survey was calculated from these numbers for each institution. It should be noted that the total number of all intercollegiate athletes, including junior varsity athletes, at

each institution was also reported (Section II, question one), however the decision was made to use the percentage of female varsity athletes for two reasons: 1) junior varsity programs tend to raise additional gender equity arguments such as those addressed in Chapter 2 that would confound this study, and 2) it has become common practice to look only at varsity athletics when evaluating substantial proportionality.

Information regarding the percentages of males and females in the undergraduate student body at each institution was not requested in this survey; however, the NCAA does keep a record of this information on each member institution. Therefore, it was possible to add the percentage of females in the undergraduate student population to the data set of each institution as an additional variable.

The NCAA classification of each institution was entered as a numerical code based upon the institution's response to the pertinent question in the "General Organizational Data" section of the questionnaire survey (Section I, question two). It should be noted that divisional analyses were conducted using only the primary divisional levels, therefore, Divisions IA, IAA, and IAAA became "Division I," Divisions II with football and II without football became 'Division II,' and Divisions III with football and III without football became "Division III."

Lastly, although the football status of each institution was not specifically requested, it could be inferred from an institution's divisional level in all instances except with Division IAAA institutions. Institutions listing themselves in Divisions IA, IAA, II with football, and III with football were placed in the "Yes" group for football status, while Divisions II without football and III without football were placed in the "No"

group Division IAAA institutions had to be eliminated from the analyses based upon football status since this division is a mixture of institutions that sponsor football at the Division II or III level and institutions that do not sponsor football

Collection of Data

This study was based on a data set composed of financial and gender proportionality information as well as the divisional classifications and football status of 492 NCAA institutions for fiscal year 1992-93 The number of responses based upon divisional level are presented in Table 1

Table 1 1992-93 NCAA Financial Survey Responses by Divisional Level

Division	Number of Members	Number of Responses	Percent Responding
IA	106	85	81%
IAA	115	74	65%
IAAA	80	48	60%
II with Football	142	72	51%
II without Football	103	49	48%
III with Football	198	91	46%
III without Football	148	73	50%
TOTAL	**892**	**492**	**55%**

As stated above, all data was obtained from the 1993 NCAA financial survey or the institutional files maintained by the NCAA on each member institution. Resource allocation variables were derived from the 12 resource allocation figures of each institution. The dependent variable in the mathematical models was based upon the gender proportionality data of each institution. Lastly, specific relationships between resource allocation patterns and gender proportionality were analyzed through the use of variables representing three categories of gender proportionality, three divisional levels, and football status currently found at NCAA member institutions.

Statement of Variables

Selection of variables was based upon logic, feasibility, and convenience. As mentioned above, the NCAA financial survey provided the most accurate and reliable instrument with which to obtain the data necessary to analyze the relationships between resource allocation patterns and gender proportionality; therefore, the pre-defined resource allocation categories of the NCAA were used to derive the resource allocation variables. Further, the female participation percentage in intercollegiate athletics and the percentage of females in the undergraduate student population at each institution were used to derive the gender proportionality variable. The three categories of gender proportionality, the divisional level of each institution, and the football status of each institution were used to test for specific relationships between resource allocation patterns and gender proportionality.

The variables obtained from the 1992-93 NCAA financial survey (or NCAA files in the case of institutional undergraduate student composition) were as follows:

PERCWOM--The percentage of female full-time students in the full-time undergraduate student population at each institution.

PERCFATH--The percentage of female varsity intercollegiate athletes at each institution

CLASS--The NCAA institutional classification (divisional level) of each institution. The seven classifications are assigned based upon competitive level and are designated as Divisions IA, IAA, IAAA, II with football, II without football, III with football, and III without football.

GIA--The total annual cost of grants-in-aid (athletic scholarships) to an athletic program. The variable was further broken down into GIAW, GIAM, and GIAA, the amount of money spent on grants-in-aid for female athletes, male athletes, and administration, respectively

GUAR--The total annual cost of guarantees and options. This variable represented all monies paid to visiting institutions for their participation in athletic events during a one-year period. It was further broken down into GUARW, GUARM, and GUARA, guarantees for women's events, men's events, and administrative purposes, respectively

SAL--The total annual cost of salaries/wages/fringes. It was further broken down into SALW, SALM, and SALA

TRAVL--This variable represented the total cost of all competition-related travel by athletes, coaches, trainers, managers, physicians, and administrators during a one-year period. It included such things as transportation, hotel accommodations, per-diem

allowance for meals, and miscellaneous costs incurred while traveling to competitions It was subdivided into TRAVLW, TRAVLM, and TRAVLA

RECRUIT--This variable included any costs incurred as a result of scouting and recruiting potential student-athletes during a one-year period It was subdivided into RECRUITW RECRUITM, and RECRUITA.

EQUIP--This variable included all monies spent on equipment, uniforms, and supplies for the intercollegiate athletic teams during a one-year period It was subdivided into EQUIPW, EQUIPM, and EQUIPA

FUND--This variable represented all costs incurred in the affort to raise funds for an athletic program during a one-year period. It was subdivided into FUNDW, FUNDM, and FUNDA.

INSUR--This variable represented the cost to an athletic program of all insurance premiums over a one-year period It was subdivided into INSURW, INSURM, and INSURA

CONT--This variable included any costs that were incurred through services provided based on outside contracts (contract services) over a one-year period Examples of these types of costs would be payment for legal services rendered or payment of a contract employee such as a nutritionist or a psychologist It was subdivided into CONTW CONTM, and CONTA

OTHER--This variable included all operating expenses that required cash or other assets to generate revenue that were not explicitly covered by the above variables These

expenses were also reported over a one-year period This variable was broken down into OTHERW, OTHERM, and OTHERA

DEBT—This variable represented all expenditures going toward debt service or the reduction of an athletic program's debt over a one-year period. Expenditures were broken down into DEBTW, DEBTM and DEBTA

CAP—This variable represented all capital expenditures for the building of new facilities and/or the renovation of existing facilities over a one-year period Expenditures were broken down into CAPW, CAPM, and CAPA.

TLBUD--This variable represented the total budget of an athletic program for a one-year period. It was the sum of the 12 resource allocation variables listed above

The non-financial variables used to test for significant relationships between resource allocation patterns and gender proportionality in intercollegiate athletics are defined in Table 2 on the following page The resource allocation variables used in this study were defined from the above variable list and follow in Table 3 on page 68

Resource allocation variables were derived as percentages of the total athletic budget or percentages of the total amount of money devoted to a resource allocation category for standardization purposes This was necessary due to the wide range of total expenditures found at NCAA institutions spanning from a reported low of approximately $300,000 a year to a reported high of approximately $28,000 000 a year These two different frames of reference were used to create two separate mathematical models as well as to look at specific resource allocation/gender proportionality relationships from two different perspectives

Table 2 Definition of Non-Financial Variables Used in the Study

Variable	Definition
PROP	This continuous variable measured the degree of gender proportionality achieved by each institutioo It was defined as the difference between the percentage of female full-time students and the percentage of female varsity intercollegiate athletes (PERCWOM - PERCFATH)
CATPROP	This categorical variable represented the three gender proportionality classifications into which institutions were placed Classifications were substantial proportiooality (SP) defined as -5 <= PROP <= 5 borderline proportionality (BP) defined as 6 <= PROP <= 15 or -15 <= PROP <= -6, and non-proportiomality (NP) defined as PROP >=16 or PROP <= -16.
DIVISION	This categorical variable represeoted the three major NCAA divisional levels It took the seven divisioos of the variable CLASS and combined these divisions into the three major NCAA rankings (i.e , Divisions I, II, and III)
FTBALL	This categorical variable represented the football status of an institution (i e , the institution sponsors football as one of its varsity sports or it does not)

Table 3 Definition of Resource Allocation Variables Used in the Study

Variable	Definition
PTGIAW	The percentage of the total athletic budget spent on grants-in-aid for female athletes (100*GIAW/TLBUD)
PCGIAW	The percentage of all money devoted to the allocation category 'grants-in-aid' that went to women (100*GIAW/GIA)
PTFUNDW	The percentage of the total athletic budget spent on raising funds for women's sports (100*FUNDW/TLBUD)
PCFUNDW	The percentage of all money devoted to the allocation category 'fund-raising' that went to women (100*FUNDW/FUND)
PTRECRUITW	The percentage of the total athletic budget spent on recruiting and scouting for women's sports (100*RECRUITW/TLBUD)
PCRECRUITW	The percentage of all money devoted to the allocation category 'recruiting and scouting' that went toward women's sports (100*RECRUITW/RECRUIT)
PTEQUIPW	The percentage of the total athletic budget spent on equipment, uniforms, and supplies for women (100*EQUIPW/TLBUD)
PCEQUIPW	The percentage of all money devoted to the allocation category 'equipment, uniforms, and supplies' that went toward women's sports (100*EQUIPW/EQUIP)
PTTRAVLW	The percentage of the total athletic budget spent on travel for women's sports (100*TRAVLW/TLBUD)
PCTRAVLW	The percentage of all money devoted to the allocation category 'travel' that went toward women's sports (100*TRAVLW/TRAVL)
PTSALW	The percentage of the total athletic budget spent on salaries/wages/fringes for women's sports (100*SALW/TLBUD)
PCSALW	The percentage of all money devoted to the allocation category 'salaries' that went toward women's sports (100*SALW/SAL)
PTCAPW	The percentage of the total athletic budget spent on capital expenditures for women's sports (100*CAPW/TLBUD)
PCCAPW	The percentage of all money devoted to the allocation category 'capital expenditures' that went to women (100*CAPW/CAP)

Qualitative Reasons for the Selection of Variables

Decisions needed to be made regarding which resource allocation variables would be included in the mathematical models and which variables would be analyzed for their individual significances to gender proportionality in intercollegiate athletics. These decisions were made based upon regression guidelines and upon specific knowledge of the field of sport administration.

Two basic guidelines are usually followed in the construction of regression models (Agresti and Finlay, 1986, p. 375). First, it is desirable to include sufficiently many variables to make the model useful for predictive, explanatory, or theoretical purposes, therefore variables that are of theoretical importance to the study should be included in the regression model. Secondly, it is desirable to obtain a model that has good predictive power as measured by a reasonably high R^2-value while keeping the model as simple as possible. Therefore, based upon these regression guidelines, it was determined that only the resource allocation variables that were believed to directly affect, or to have an important indirect affect on, gender proportionality in higher education would be included in the models. It was believed that this criterion would create good predictive models while still keeping the models relatively simple.

Specific knowledge of applied sport administration was used to select these variables that were believed to directly affect (or have an important indirect affect on) gender proportionality in intercollegiate athletics. Seven resource allocation variables were believed to have the greatest impact on gender proportionality and were therefore believed to be the best predictors of gender proportionality in the resultant regression

models. It should be noted that due to the lack of research in this area, personal observation and reason were deemed the most accurate methods of variable selection.

A justification for the selection of the independent variables based upon reason has been established by Jacob Cohen (1977) in his well-known development of the effect size of an experiment. In his text, Cohen explained how effect size is the most important determinant of the power or required sample size of a study, but at the same time it was one of the least understood concepts in the area of statistical inference. Much of this confusion was brought about by the conflicting procedures that had been developed by other researchers. Cohen argued that the relationship between effect size and power or sample size should be intuitively evident: the larger the effect size expected (with all other things being equal), the greater the power of the test, or, the larger the expected effect size (with all other things being equal), the smaller the sample size necessary to detect it.

Since effect size was then being expressed in terms of the data, test, or statistical model employed, Cohen argued the desirability of reducing the diversity of units being used. He explained how a universal index would be impractical and unuseful to researchers, but he believed that some degree of generalization was necessary to provide researchers with conventional guidelines from which their studies could be based. Therefore, Cohen proposed effect size values to serve as operational definitions of the qualitative adjectives "small," "medium," and "large."

Cohen justified his definitions by stating that all conventions are arbitrary. Further, since all conventions are arbitrary, one can only demand that they are not

unreasonable Cohen stated, "Although arbitrary, the proposed cooventions will be found to be reasonable by reasoosble people." (1977, p 13) Cohen went on to give operational definitions of "small," "medium " and "large, ' which, since the text's publicatioo in 1977, have become widely used in the behavioral science field. Therefore, seven resource allocation variables were selected as independent variables because they were believed to be reasonable predictors of geoder proportionality

It was believed that in order to predict the difference in the percentage of women in the undergraduate student population and the percentage of female varsity athletes (PROP), the reasonable indices should be the amount of money spent on grants-in-aid for women (GIAW) the amount of money spent on raising funds for women's sports (FUNDW) the amount of money spent on recruiting and scouting for women's teams (RECRUITW), the amount of money spent on equipment for women's teams (EQUIPW), the amount of money spent oo travel for women's teams (TRAVLW) the amount of money spent oo salaries for womeo's teams (SALW) and the amount of money spent on capital improvements for women's sports (CAPW).

The first three variables (GIAW, FUNDW, and RECRUITW) were believed to have direct inverse effects on gender proportionality It was believed that the amount of money spent on grants-in-aid for women should directly affect the number of women's scholarships offered by an institution Since a greater number of women's scholarships should directly increase the female participation rate, increasing grants-in-aid should decrease PROP if women are the under represented sex (as they almost always are) Secondly, the amount of money spent on raising funds for women's sports should directly

affect the amount of money raised through these activities. If additional money is raised for the womens' programs it is reasonable to expect that some of this money could go toward increasing the number of opportunities for women thereby decreasing PROP (again if women are the under represented sex). Thirdly, increasing the money spent on recruiting/scouting female athletes should attract more female athletes to a particular athletic program; therefore, the female participation rate should increase causing a decrease in PROP.

The last four independent variables (EQUIPW, TRAVLW, SALW, and CAPW) were believed to have significant indirect effects on gender proportionality, also of an inverse nature. By increasing the equipment and capital expenditures budgets for women's sports, an institution may be able to outfit/accommodate more athletes, and more potential athletes may also be attracted to the athletic program. Likewise, increasing the travel budget for women's teams may allow these teams to take a sufficient number of athletes to away games and championship competition sites. By increasing the salary paid to women's coaches and staff an institution will most likely attract more qualified applicants who will be dedicated to maintaining successful teams and will take pride in maintaining full rosters. Therefore, it appears reasonable that all of these factors should have a significant effect, even if it is indirect, on the female participation rate at an institution thereby reducing PROP.

It should be noted that the other five resource allocation variables (GUARW, INSURW, CONTW, OTHERW, and DEBTW) were not believed to have significant impacts on the gender proportionality present at an institution. The amount of money an

athlete program gives to visiting women's opponents, the amount of money spent on insurance for women's programs, the amount of money spent on contract services for women's teams, and the amount of money spent on the women's debt service were not deemed important to an institution's strides to increase the number of athletic opportunities for females (if they are indeed the under represented sex) Although these resource allocations are important to the overall operation of an athletic program, their link to gender proportionality was judged as slight and indirect at best The last variable OTHERW, was not included in the mathematical models due to the ambiguity of this resource allocation category Since institutions were not required to specify the types of expenditures that were placed in this category, a link to gender proportionality could not be concluded.

The first regression model was created by relating the seven selected resource allocation variables to the total athletic budget of each institution. As mentioned above these variables were derived as percentages of the total athletic budget for standardization purposes due to the wide range of total expenditures found at NCAA member institutions Each variable was prefaced with a "PT" denoting "percent of the total budget " For example, PTGIAW represented the amount of money spent on grants-in-aid for women as a percentage of the total athletic budget Therefore, the first mathematical model was presented as follows

PROP = PTGIAW + PTFUNDW + PTRECRUITW + PTEQUIPW + PTTRAVLW + PTSALW + PTCAPW

The second model was formulated by altering the frame of reference, the second set of resource allocation variables were calculated as the percent of money appropriated to women's sports within a resource allocation category. The rationale behind the formation of this second mathematical model was that a different frame of reference could potentially result in an increased understanding of the relationships between resource allocation patterns and gender proportionality by uncovering relationships not revealed through the first frame of reference. These variables were prefaced with a "PC" denoting "percent of category." For example, PCGIAW represented the amount of money spent on grants-in-aid for women as a percentage of the amount of money spent on all grants-in-aid. Therefore, the second mathematical model was presented as follows:

PROP = PCGIAW + PCFUNDW + PCRECRUITW + PCEQUIPW + PCTRAVLW + PCSALW + PCCAPW

The decision was made to use the same sets of variables (the seven resource allocation variables with two different frames of reference) in the analysis of variance (ANOVA) analyses since the underlying research question remained the same. In other words, the ANOVA analyses were likewise attempting to discover which resource allocation variables significantly affect gender proportionality in intercollegiate athletics. Therefore, the variables selected for their reasonableness in the mathematical models were also deemed reasonable for the ANOVA analyses.

As will be described below, ANOVA techniques were used instead of regression techniques to study the relationships between CATPROP, DIVISION, and FTBALL and

the resource allocation variables due to the categorical nature of these variables. These categorical variables were developed to ascertain if resource allocation patterns are significantly different between institutions in the three categories of gender proportionality, in the three divisional levels and with different football statuses. These additional questions were posed in an attempt to gain a more accurate understanding of the relationships between resource allocation patterns and gender proportionality at NCAA member institutions.

By using categorical variables to answer this second set of questions, a different mode of analysis proved necessary. Therefore, although the mode of analysis changed, the basic research question did not, so the same variables were still deemed reasonable. Further, with respect to the three categories of gender proportionality, although they have been defined previously (i.e., substantial proportionality, borderline proportionality, and non-proportionality), special attention should be drawn to the fact that these categories were also developed based upon conventions that should appear reasonable to the reasonable person.

Lastly, it is commonly agreed that 5-to-1 is the minimum acceptable ratio of number of observations to variables. According to Stevens (1992, p. 384), "Many of the popular rules suggest that sample size be determined as a function of the number of variables being analyzed, ranging anywhere from two [observations] per variable to 20 [observations] per variable. And indeed, in the previous edition of this text, I suggested five [observations] per variable as the minimum needed." Therefore, the 55.9-to-1 ratio resulting from 447 observations (some observations were eliminated as will be discussed

in the subsequent chapter) and eight variables (seven independent and one dependent variable) sufficiently satisfied this criteria in the first mathematical model. This criterion was also more than sufficiently met in each of the ANOVA analyses (ratios ranged from 28.3-to-1 to 156.3-to-1). However, as will be discussed in the next chapter, this criterion was not able to be met in the second mathematical model due to missing data.

Statistical Analyses

The mathematical models created to test if there are significant relationships between resource allocation patterns and gender proportionality in intercollegiate athletics were analyzed through the use of multiple regression techniques using the Statistical Analysis System (SAS) on the University of Florida's mainframe. One purpose of multiple regression is to predict or estimate the value of one variable from known or assumed values of other variables related to it (Younger, 1979, p. 1-3). Since this was the case in this study, multiple regression was deemed the proper analytical tool to identify significant relationships between resource allocation patterns and gender proportionality in intercollegiate athletics. Further, multiple regression could be used in these analyses due to the continuous nature of the dependent variable, PROP.

Two models were tested to determine the significance of the relationships between resource allocation patterns and gender proportionality using two different frames of reference. After the significance of each model was tested, multiple regression allowed for the testing of independent variables for individual significances with the dependent variable while controlling for the effects of all other variables in the model. This was possible since multiple regression determines if an individual variable has a

significant effect on the dependent variable while holding all other variables constant. Therefore, the first two research questions were as follows

1 Is the mathematical model comprised of seven resource allocation variables expressed as percentages of institutions' total athletic budgets significantly related to the gender proportionality observed at those institutions?

2 Is the mathematical model comprised of seven resource allocation variables expressed as percentages of institutions' budgets to each resource allocation category significantly related to the gender proportionality observed at those institutions?

Three other variables, CATPROP, DIVISION and FTBALL, were created in an attempt to more fully understand the relationships between resource allocation patterns and gender proportionality in intercollegiate athletics These categorical variables were developed to ascertain if resource allocation patterns are significantly different between institutions in the three categories of gender proportionality, in the three divisional levels, and with different football statuses In other words, they were created with the goal of identifying relationships between resource allocation patterns and gender proportionality that could not be identified in the regression analyses. For example, these tests identified relationships that could potentially help non-proportionate and borderline proportionate institutions move into the substantially proportionate category They also identified significant differences between resource allocation patterns at different divisional levels and at institutions that sponsor and do not sponsor football in an attempt to gain more insight into how resource allocation patterns relate to gender proportionality The research questions for these analyses were as follows

3 Are any of the seven resource allocation variables expressed as percentages of institutions' total athletic budgets or any of the seveo resource allocation variables expressed as percentages of the institutions' budgets to each resource allocation category significantly related to the category of gender proportionality observed at those institutions?

4 Are any of the seven resource allocation variables expressed as percentages of institutions' total athletic bodgets or any of the seven resource allocation variables expressed as percentages of the institutions' budgets to each resource allocation category significantly related to the NCAA divisional level of those institutions?

5 Are any of the seven resource allocation variables expressed as percentages of institutions' total athletic budgets or any of the seven resource allocation variables expressed as percentages of the institutions' budgets to each resource allocation category significantly related to the football status of those institutions?

Analysis of variance (ANOVA) techniques were selected to analyze these relationships due to the categorical nature of CATPROP, DIVISION, and FTBALL. As mentioned previously, the categorical nature of these variables required a different mode of analysis. In these analyses, ANOVAs were run to check for the existence of a significant difference between the means of the three categories of gender proportionality on each of the seven resource allocation variables, between the means of the three divisional levels on each of the seven resource allocation variables, and between the two football statuses on each of the seveo resource allocation variables

ANOVA techniques estimate the variance of group means and the variance of observations within groups, deriving a ratio of the two. If the ratio is large enough, a statistically significant difference is determined. ANOVA techniques can easily be run with categorical variables because ANOVA looks for significant differences between the classifications chosen and one particular variable ignoring all other variables in the system. Each test is totally unrelated to all other tests, therefore, if a variable is significant in an ANOVA analysis it is significantly different across the dependent variable. Multiple regression could not have been used with these categorical variables because it would have resulted in a prediction model with values in between the categories which would obviously not have made sense. The willingness to ignore all other resource allocation variables in the ANOVA analyses was presumed to be acceptable since the variables are believed to be conceptually independent and therefore should not have affected one another.

If a significant difference was found to exist between the means of CATPROP or DIVISION and one of the seven resource allocation variables, Bonferroni post hoc tests were performed to determine which pair of means significantly differed from one another on that particular resource allocation variable. The Bonferroni procedure employs standard t-tests to test for significant differences between each pair of groups (i.e., "NP" and "BP," "BP" and "SP," and "NP" and "SP", or Divisions I and II, II and III, and I and III); however, the procedure adjusts alpha to control for the Type I experimentwise error rate. This adjustment deflates alpha to correct for the inflation that would be brought about through multiple tests. It should be noted that this deflation of alpha results in a

higher critical value and thus a higher Type II error rate The new alpha level becomes 0 05 divided by three (since there are three comparisons), or 0 0167, therefore, a p-value of less than or equal to 0 0167 must be found to conclude a significant difference between two groups.

With respect to FTBALL, it should be noted that a post hoc test was not necessary in the football versus no football comparison since there were only two groups. If a significant difference was detected in the ANOVA test, simple statistics were utilized to describe the difference between football sponsoring and non-sponsoring institutions

Null Hypotheses and Alpha Level

The null hypothesis for each mathematical model took on the form

$$H_o \quad \text{All } beta_i = 0$$

This hypothesis considered whether the seven resource allocation variables collectively had a statistically significant effect on the gender proportionality variable, PROP in each mathematical model The null hypotheses for the first two research questions were stated as follows

1 The mathematical model comprised of the seven resource allocation variables expressed as percentages of institutions' total athletic budgets is not related to the gender proportionality observed at those institutions

2 The mathematical model comprised of the seven resource allocation variables expressed as percentages of institutions' budgets to each resource allocation category is not related to the gender proportionality observed at those institutions

The study attempted to disprove these null hypotheses. In other words, the study attempted to prove that the mean of PROP, the gender proportionality variable, did depend on the values of the resource allocation variables in each mathematical model, the alternative hypothesis. The alternative hypothesis for each mathematical model took on the form

$$H_A: \text{At least one beta}_i \neq 0$$

Therefore, rejecting H_o would mean that there was a statistically significant relationship between resource allocation patterns and gender proportionality. Multiple regression analyses were used to determine the statistical significance of the regression model and which, if any, of the resource allocation variables were significantly related to gender proportionality.

The null hypotheses for the ANOVA analyses were as follows:

$$H_o: \mu_i = \mu_j \text{ for all } i, j$$

The null hypotheses for these analyses were stated as follows:

3. None of the resource allocation variables in either frame of reference are significantly related to the category of gender proportionality observed at NCAA member institutions.

4. None of the resource allocation variables in either frame of reference are significantly related to the NCAA divisional level of member institutions.

5. None of the resource allocation variables in either frame of reference are significantly related to the football status of NCAA member institutions.

The alternative hypotheses were as follows

$$H_A \ \mu_i \neq \mu_j \text{ for at least one pair of } i, j$$

The goal was once again to reject the null hypotheses Rejecting a null hypothesis would signify that at least one pair of means were significantly different for a particular resource allocation variable As mentioned above, if a null hypothesis was indeed rejected, post hoc tests were run to determine exactly where the significant difference(s) occurred (except in the case of football status where no post hoc tests were necessary).

The alpha level was set at 0 05 for both the regression and ANOVA analyses since this is the standard alpha level used in most educational studies Further, based upon the number of variables and observations in this study, this alpha level established the appropriate balance between detecting a true relationship if one existed and the chance of making a false conclusion. An alpha level of 0 05 indicates that if a random sample is drawn from the population, only five times out of 100 would the observed pattern of results occur This rarity is generally accepted as an indication that the observed results do not occur very often by chance Therefore, if H_o was rejected in any one of the analyses it was probably due to some factor(s) other than chance In other words, it was probably due to some underlying relationship

Chapter Summary

Intercollegiate athletic programs on the whole, like education in general, are in the midst of some tough financial times These tough times make it all the more crucial that athletic administrators reexamine their institutions' resource allocation patterns in order to identify what potential solutions exist The mathematical models and the individual

resource allocation/ gender proportionality relationships developed in this study give important insight into which resource allocation variables are related to gender proportionality Further, this information could potentially help administrators determine if existing resources are allocated in the most efficient and cost effective manner possible, or if changes can be made that could potentially increase the number of opportunities for women under current budgetary constraints Stated simply, the use of these models and relationships could potentially aid administrators in determining the best allocation of resources to come into compliance with Title IX

CHAPTER 4
PRESENTATION OF DATA

Introduction

The purpose of this study was to develop and analyze mathematical models to explain the relationships among resource allocation patterns and gender proportionality in intercollegiate athletics using two different frames of reference. The first research question posed in this study was whether or not a mathematical model relating seven resource allocation variables expressed as percentages of institutions' total athletic budgets was significantly related to the gender proportionality observed at those institutions. The null hypothesis for this research question was that the first mathematical model was not related to the gender proportionality observed at NCAA member institutions. The null hypothesis was rejected for the first mathematical model and it was concluded that this model is a representation of the relationships between resource allocation patterns and gender proportionality in intercollegiate athletics. In addition, one resource allocation variable was found to have an individual significant relationship with the gender proportionality observed at NCAA member institutions controlling for the other variables in the model.

The second research question posed in this study was whether or not a mathematical model relating seven resource allocation variables expressed as percentages of institutions' budgets to each resource allocation category was significantly related to

the gender proportionality observed at those institutions. The null hypothesis for this research question was that the second mathematical model was not related to the gender proportionality observed at NCAA member institutions. The null hypothesis failed to be rejected and it was concluded that this group of resource allocation variables does not serve as a representation of the relationships between resource allocation patterns and gender proportionality based upon the institutions participating in this study.

A further purpose of this study was to analyze the relationships between individual resource allocation variables believed to play a significant role in achieving gender proportionality and three categories of gender proportionality, three divisional levels, and the football status of NCAA member institutions. Therefore, the third research question posed in this study was whether or not any of the seven resource allocation variables expressed as percentages of institutions' total athletic budgets or any of the seven resource allocation variables expressed as percentages of institutions' budgets in each resource allocation category were significantly related to the category of gender proportionality observed at those institutions. The null hypothesis for this research question was that none of the resource allocation variables in either frame of reference were significantly related to the category of gender proportionality observed at those institutions. The null hypothesis was rejected and it was concluded that two resource allocation variables expressed as percentages of institutions' budgets to those resource allocation categories were significantly different between at least two categories of gender proportionality found at NCAA member institutions.

The fourth research question posed in this study was whether or not any of the seven resource allocation variables in either frame of reference were significantly related to the NCAA divisional level of the institutions. The null hypothesis for this research question was that none of the resource allocation variables in either frame of reference were significantly related to the NCAA divisional level of those institutions. The null hypothesis was rejected and it was concluded that five resource allocation variables expressed as percentages of institutions' total athletic budgets and all seven resource allocation variables expressed as percentages of the institutions' budgets to those resource allocation categories were significantly different between at least two NCAA divisional levels.

Lastly, the fifth research question posed in this study was whether or not any of the seven resource allocation variables in either frame of reference were significantly related to the football status of the institutions. The null hypothesis for this research question was that none of the resource allocation variables in either frame of reference were significantly related to the football status of those institutions. The null hypothesis was rejected and it was concluded that five resource allocation variables expressed as percentages of institutions' total athletic budgets and all seven resource allocation variables expressed as percentages of the institutions' budgets to those resource allocation categories were significantly different between institutions that sponsored football and those that did not.

Multiple regression techniques were utilized in the formation of the mathematical models in this study while ANOVA tests were executed to analyze the relationships

between resource allocation patterns and gender proportionality that could not be identified through the regression analyses Further, because the data used in this study were crucial to the models and relationships that were established, an extensive analysis of the data was first completed in order to ascertain that all statistical assumptions had been satisfied and that the data met certain established standards The results of these analyses are the topic of this chapter

Descriptive Analysis of the Data

The NCAA questionnaire survey requesting revenue and expense information for the 1992-93 fiscal year was sent to all 892 member institutions A total of 492 surveys were returned yielding a return rate of 55 percent However, added to the information on these surveys was the percentage of females in the undergraduate student population at each institution. The NCAA files did not contain this information on an additional 19 institutions; therefore the final number of useful institutional data sets totaled 473 Breakdowns by divisional level are reported in Table 4

Table 4 Useable Institutional Data Sets by Divisional Level

Classification	Freq	Percent	Cumulative Frequency	Cumulative Percent
IA	84	17 8	84	17 8
IAA	73	15 4	157	33 2
IAAA	46	9 7	203	42 9
II w/ football	70	14 8	273	57 7
II w/out fball	43	9 1	316	66 8
III w/ football	90	19 0	406	85 8
III w/out fball	67	14.2	473	100 0

All analyses began with these 473 data sets However, additional data sets often needed to be dropped from individual analyses due to insufficient information to meet the specific criteria of that particular analysis For this reason, the number of data sets used in each individual analysis was listed with the results of that analysis

After the useable data sets were gathered, the SAS statistical program on the University of Florida's main frame was used to analyze the data Of initial interest were the descriptive statistics for the gender proportionality variable PROP, the difference between the percentage of women in the undergraduate student population and the percentage of female varsity athletes, as well as the other three non-financial variables used to provide insight into the resource allocation/gender proportionality relationships the categorical variables CATPROP (the three classifications of gender proportionality) DIVISION (the three major divisional levels of the NCAA), and FTBALL (whether or not an institution sponsored football as one of its varsity sports) Descriptive statistics were analyzed to ensure that all statistical assumptions about the data had been met.

The first item that was analyzed was the distribution of the gender proportionality variable PROP This variable was calculated as the difference between the aforementioned percentages rounded to the nearest whole number The distribution of this gender proportionality measure is presented in Table 5 on the following page.

The second item that was analyzed was the categorical variable, CATPROP The three categories of gender proportionality used in this study were substantial proportionality (SP), borderline proportionality (BP), and non-proportionality (NP) The distribution of institutions by category are reported in Table 6 on page 90

Table 5 Distribution of the Gender Proportionality Variable PROP

PROP	Freq	Percent	Cumulative Percent
-17	1	0 2	0 2
-14	1	0 2	0 4
-13	2	0 4	0 9
-12	1	0 2	1 1
-11	3	0 7	1 8
-9	1	0 2	2 0
-7	1	0 2	2 2
-5	1	0 2	2 4
-4	2	0 4	2 9
-3	1	0.2	3 1
-2	2	0 4	3 5
-1	2	0 4	4 0
0	3	0 7	4 7
1	3	0 7	5 3
2	3	0 7	6 0
3	5	1 1	7.1
4	7	1 6	8 6
5	6	1 3	10 0
6	9	2 0	12.0
7	11	2 4	14 4
8	14	3 1	17 5
9	11	2 4	20 0
10	7	1 6	21 5
11	12	2 7	24 2
12	15	3 3	27 5
13	10	2.2	29 7
14	13	2 9	32.6
15	25	5 5	38 1
16	21	4 7	42.8
17	19	4.2	47 0
18	27	6 0	53 0
19	16	3 5	56 5
20	19	4 2	60 8
21	21	4 7	65 4
22	25	5 5	71 0
23	15	3 3	74 3
24	17	3 8	78 0
25	12	2 7	80 7

Table 5--continued

PROP	Freq.	Percent	Cumulative Percent
26	15	3 3	84 0
27	14	3 1	87 1
28	17	1 6	88 7
29	11	2.4	91 1
30	9	2 0	93.1
31	8	1.8	94.9
32	5	1.1	96 0
33	4	0 9	96.9
34	7	1 6	98 4
35	1	0 2	98 7
36	1	0 2	98.9
37	2	0 4	99 3
39	1	0.2	99.6
40	1	0.2	99 8
44	1	0.2	100 0

Table 6 Distribution of the Categorical Variable CATPROP

Cat. of Prop.	Def of Category	Freq	Percent	Cumulative Frequency	Cumulative Percent
SP	-5 <= PROP <= 5	32	6 8	32	6 8
BP	-15 <= PROP <= -6 or 6 <= PROP <= 15	123	26 0	155	32 8
NP	PROP <= -16 or PROP >= 16	318	67 2	473	100 0

The descriptive statistics for gender proportionality met the study's assumptions The above tables demonstrate that the majority of institutions of higher education will need to make great strides toward gender equity in the coming years Only 6 8 percent of the NCAA member institutions in the sample had gender proportionality rates that would

most likely be found in compliance by this aspect of Title IX (a difference in percentages of less than or equal to five percentage points) Further, while approximately one-quarter of the sampled institutions had gender proportionality rates that were close to meeting this criteria for compliance, the vast majority of institutions (67 2 percent) will need to implement major changes in their athletic programs if gender equity is to be achieved For example, institutions reported discrepancies of up to 44 percent between undergraduate student compositions and varsity athlete compositions In other words, an institution may have had 52 percent females in its undergraduate student body but just eight percent females in its varsity athlete composition

One further assumption that was met by the gender proportionality data was the assumption that women were almost always the under represented sex in varsity athletics. Table 5 displays that just over two percent of all institutions sampled were not in compliance because men were under represented in their athletic programs. The remaining 91 percent of institutions not found to be substantially proportionate in their numbers all reported women as the under represented sex

After the gender proportionality variables and assumptions were analyzed, the other two non-financial variables studied to provide additional insight into the resource allocation/gender proportionality relationships were analyzed The first of these remaining two variables was DIVISION which represented the three major divisional levels sponsored by the NCAA Descriptive statistics for this variable are presented in Table 7 on the following page The three major NCAA divisional levels were used instead of the seven sub-divisional levels for comparative purposes for two reasons

Table 7 Distribution of the Categorical Variable DIVISION

Division	Freq	Percent	Cumulative Frequency	Cumulative Percent
I	203	42 9	203	42 9
II	113	23 9	316	66 8
III	157	33 2	473	100 0

resource allocation variables were hypothesized to be similar between subdivisions of each divisional level and reducing the number of comparisons prevented the experimentwise error rate from escalating

The last categorical variable of the data that was analyzed was FTBALL, the football status of each institution The descriptive statistics for FTBALL are presented in Table 8

Table 8 Distribution of the Categorical Variable FTBALL

Football Status	Freq	Percent	Cumulative Frequency	Cumulative Percent
Football	317	74 2	317	74 2
No Football	110	25 8	427	100 0

As described in the previous chapter, all Division IA, IAA, II with football, and III with football institutions offered football and thus were placed in the "football" category Institutions falling into the "no football" category were Divisions II without football and III without football Further, only 427 institutions were used in this particular analysis because the 46 institutions of Division IAAA had to be excluded from the analysis.

(Chapter 2 detailed the ambiguity present in the football statuses of Division IAAA institutions. Due to this ambiguity, these institutions could not be used in this particular analysis.)

Descriptive Analysis of the Resource Allocation Variables

Descriptive statistics for the resource allocation variables were also analyzed in order to obtain a basic understanding of how NCAA member institutions allocated their resources. Descriptive statistics on the resource allocation variables were first analyzed for the data set as a whole (these simple statistics formed the basis of the regression equations), followed by breakdowns based upon the three categorical variables (the basis of the ANOVA analyses).

There were two sets of resource allocation variables used in this study. The first set of resource allocation variables represented the percentage of the total athletic budget that went toward funding a particular component of a women's program, while the second set of resource allocation variables represented the percentage of the total appropriation to a resource allocation category that was granted to a women's program. These two sets of variables were denoted "PT" for "percent of the total budget" and "PC" for "percent of the resource allocation category budget" in order to provide information on the percent of the total budget and the percent of the category budget that went toward women's sports in each of the subsequent analyses.

The descriptive statistics for the resource allocation variables on the data set as a whole are presented in Table 9 on the following page. It can be seen that there was a wide span of percentages of the total budget given to women's resource allocation

Table 9 Resource Allocation Statistics for the Entire Data Set

Variable	Mean	Std. Deviation	Minimum	Maximum
PTGIAW	6 06	6 58	0	37 07
PTFUNDW	0 12	0 66	0	8 77
PTRECRUITW	0 59	0 84	0	8 54
PTEQUIPW	2 12	3 27	0	29 17
PTTRAVLW	3 88	4 13	0	29 28
PTSALW	8 39	9 52	0	83 88
PTCAPW	0 09	0 64	0	7 90
PCGIAW	32 64	13 09	0	100 00
PCFUNDW	10 50	21 48	0	100 00
PCRECRUITW	27 14	17 39	0	100 00
PCEQUIPW	26 67	18 05	0	100 00
PCTRAVLW	35 14	15 99	0	100 00
PCSALW	21 14	15 63	0	100 00
PCCAPW	12 44	22 78	0	100 00

categories ranging from almost 84 percent of the total athletic budget allocated to salaries for the staff and coaches of women's sports to no allocation at at least one institution on every resource allocation variable There was also a wide span of allocations to women within each resource allocation category As can be observed above, at least one institution reported that women received no portion of a particular resource allocation category on each category while at least one institution reported that women received the entire appropriation to a certain category on each category

The descriptive statistics for the resource allocation variables with data categorized by the level of gender proportionality achieved by NCAA member institutions are reported in Table 10 on the following page From the simple statistics, it can be observed that institutions in the three categories of gender proportionality tend to

Table 10 Resource Allocation Statistics by Category of Gender Proportionality

Variable	Category	Mean	Std. Dev	Min.	Max
PTGIAW	NP	6 11	5.77	0	37 07
	BP	5 86	7 66	0	35 14
	SP	6 44	9.32	0	30 95
PTFUNDW	NP	0 12	0 72	0	8 77
	BP	0 14	0 54	0	3 71
	SP	0 12	0 34	0	1 71
PTRECRUITW	NP	0 54	0 79	0	8 54
	BP	0 67	0 84	0	5 13
	SP	0 84	1 15	0	4 59
PTEQUIPW	NP	1 93	3 22	0	29 17
	BP	2 54	3 60	0	22 50
	SP	2 41	2 21	0	10 67
PTTRAVLW	NP	3 56	3 87	0	29 28
	BP	4 33	4 44	0	25 30
	SP	5 30	4 94	0	19 81
PTSALW	NP	8 53	10 71	0	83 88
	BP	8 03	6 49	0	28 85
	SP	8 40	6 62	0	29 32
PTCAPW	NP	0 11	0 68	0	7 90
	BP	0 07	0 63	0	6 86
	SP	0	0	0	0
PCGIAW	NP	31 25	13 32	0	100 00
	BP	37 07	10 45	0	53 99
	SP	36 06	15 49	0	55 26
PCFUNDW	NP	10 05	23 65	0	100 00
	BP	11 02	16 83	0	51 90
	SP	13 07	14 92	0	34 04
PCRECRUITW	NP	25 59	18 74	0	100 00
	BP	30 07	13 08	0	50 00
	SP	31 34	15 98	0	50 00
PCEQUIPW	NP	25 23	19 91	0	100 00
	BP	28 27	12 90	0	58 73
	SP	34 57	12 83	8 33	62.50
PCTRAVLW	NP	34 47	18 18	0	100 00
	BP	36 20	9 79	8 67	56 67
	SP	37 65	10 91	7 50	60 47
PCSALW	NP	21 22	17 40	0	100 00
	BP	20 62	10 87	0	52 63
	SP	22.26	11 19	0	50 00

Table 10--continued

Variable	Category	Mean	Std Dev	Min.	Max
PCCAPW	NP	13 47	23 96	0	100 00
	BP	9 67	18 60	0	50 00
	SP	0	0	0	0

allocate different percentages of their total budgets and different percentages of their resource allocation category budgets to these variables No clear trends are apparent in the "PT" variables However, there appears to be a tendency to give a higher percentage of money to women within a category as the level of gender proportionality increases from non-proportionate to substantially proportionate as displayed by the "PC" variables The validity of these observations were explored in the ANOVA analyses later in this chapter

The descriptive statistics for the resource allocation variables when the data were categorized by the three major NCAA divisional levels are presented in Table 11 on the following page Several trends were also detected in these results In the "PC" resource allocation variables, the percent of the category budget appropriated to women increased on all variables moving from Division I through Division III on the chart with the exception of grants-in-aid (remember, Division III cannot offer scholarships) These results also indicated a wide range of percentage appropriations to all resource allocation variables Once again, the significance of these trends was explored in the ANOVA analyses later in this chapter

Table 11 Resource Allocation Statistics by Divisional Level

Variable	Category	Mean	Std Dev	Min	Max.
PTGIAW	I	8 14	4 96	0	30 07
	II	10 86	7 46	0	37 07
	III	0	0	0	0
PTFUNDW	I	0 07	0 31	0	3 35
	II	0 13	0 74	0	7 70
	III	0 18	0 88	0	8 77
PTRECRUITW	I	0 57	0 72	0	8 54
	II	0 45	0 57	0	4 59
	III	0 73	1 09	0	5 13
PTEQUIPW	I	0 88	0 82	0	6 90
	II	1 48	1 43	0	8 16
	III	4 17	4 83	0	29 17
PTTRAVLW	I	2 52	2 31	0	29 28
	II	3.35	2 88	0	18 37
	III	6 00	5 60	0	29 25
PTSALW	I	5 32	2 62	0	15 11
	II	6 93	5 18	0	32 24
	III	13 34	14 35	0	83 88
PTCAPW	I	0 09	0 75	0	7 90
	II	0 09	0 50	0	4 40
	III	0 10	0 59	0	6 42
PCGIAW	I	31 75	10 52	0	82 93
	II	35 25	15 94	13 23	100 00
	III	0	0	0	0
PCFUNDW	I	5 85	13 96	0	100 00
	II	15 29	25 14	0	100 00
	III	26 79	34 90	0	100 00
PCRECRUITW	I	22 58	10 97	0	100 00
	II	28 84	17 47	0	100 00
	III	33 52	23 19	0	100 00
PCEQUIPW	I	20 86	10 43	0	58.73
	II	26 01	14 92	0	100 00
	III	34 99	24 10	0	100 00
PCTRAVLW	I	29 84	10 15	0	99 30
	II	36 16	13 47	4 95	100 00
	III	41 72	20 97	0	100 00
PCSALW	I	15 62	6 69	0	38 49
	II	21 91	11 74	0	70 77
	III	28 70	22 87	0	100 00

Table 11--continued

Variable	Category	Mean	Std Dev	Min	Max
PCCAPW	I	5 50	13 66	0	57 95
	II	22 66	30 85	0	100 00
	III	26 78	29 35	0	83 33

Lastly, the descriptive statistics for the resource allocation variables with data categorized by football status are presented in Table 12 on page 99 Results of these analyses confirm the hypothesis that institutions have a tendency to appropriate a higher percent of their category and total budgets to women when football is not sponsored by their institutions, for obvious reasons Therefore, the ANOVA analyses by football status were expected to provide some important insight into the divergences in the resource allocation/gender proportionality relationships between football sponsoring and non sponsoring institutions

Correlation Analysis of the Resource Allocation Variables

After descriptive analyses were performed on the data and the resource allocation variables, one final analysis had to be performed before the relationships between resource allocation patterns and gender proportionality could be examined It was necessary to test for multicollinearity problems This was done by performing a correlation analysis on each of the two sets of resource allocation variables

The results of the correlation analysis for the resource allocation variables defined as percentages of the total athletic budget are listed in Table 13 on page 100 The first

Table 12 Resource Allocation Statistics by Football Status

Variable	Category	Mean	Std. Dev	Min	Max
PTGIAW	Football	5 12	4 79	0	22 36
	No Football	5 77	9 21	0	37 07
PTFUNDW	Football	0 08	0 39	0	3 83
	No Football	0 23	1.13	0	8 77
PTRECRUITW	Football	0 54	0 75	0	8 54
	No Football	0 73	1.13	0	5 13
PTEQUIPW	Football	1 44	1.71	0	11 11
	No Football	4 40	5 49	0	29 17
PTTRAVLW	Football	3 02	2 61	0	18 37
	No Football	6 32	6 19	0	29.25
PTSALW	Football	6 65	5 08	0	26 03
	No Football	14 11	16 40	0	83 88
PTCAPW	Football	0 09	0 65	0	7 90
	No Football	0 06	0 34	0	2 34
PCGIAW	Football	28 13	10 42	0	100 00
	No Football	44 85	16 80	23 92	100 00
PCFUNDW	Football	7 50	17 94	0	100 00
	No Football	24 43	31 69	0	100 00
PCRECRUITW	Football	22 68	12 69	0	100 00
	No Football	42 65	24 68	0	100 00
PCEQUIPW	Football	20 55	9 70	0	50 00
	No Football	44 12	25 94	0	100 00
PCTRAVLW	Football	30 46	9 44	0	51 92
	No Football	49 16	23 71	0	100 00
PCSALW	Football	17 50	9 27	0	50 62
	No Football	33 09	25 60	0	100 00
PCCAPW	Football	10 04	19 95	0	83 33
	No Football	31 43	33 87	0	100 00

number in each set is the Pearson correlation coefficient followed by the probability under the null hypothesis of rho equaling zero

The two correlations of most concern were between PTEQUIPW (the percentage of the total budget appropriated toward equipment for women's sports) and PTTRAVLW

Table 13 Correlation Analysis of the "PT" Resource Allocation Variables

	PTGIAW	PTFUNDW	PTRECRUITW	PTEQUIPW	PTTRAVLW	PTSALW	PTCAPW
PTGIAW		0 0050 0 9134	-0 0163 0 7252	-0 2556 0 0001	-0 2328 0 0001	-0.2022 0 0001	0 0085 0 8545
PTFUNDW			0 0360 0 4364	0 0594 0 1991	0 0235 0 6123	0 2249 0 0001	0 0673 0 1454
PTRECRUITW				0 2040 0 0001	0 1761 0 0001	0 0546 0 2380	-0 0072 0 8761
PTEQUIPW					**0 4983** **0 0001**	**0 3094** **0 0001**	-0 0206 0 6561
PTTRAVLW						0 2363 0 0001	0 0062 0 8931
PTSALW							-0 0054 0 9070
PTCAPW							

(the percentage of the total budget appropriated toward travel for women's sports) and between PTEQUIPW and PTSALW (the percentage of the total budget appropriated toward salaries for coaches and staff of women's teams) Multicollinearity problems are often deemed to be a significant concern only if the Pearson correlation coefficient between the variables is greater than 0.3 and the rho value is significantly different from zero As can be seen by the bolded values, these two sets of variables met these criteria, therefore, multicollinearity concerns needed to be addressed

It was concluded that no logical or inherent relationships existed between these variables. In other words, no explanation could be determined as to why these variables should logically have been more highly correlated than any other pair of variables in this set. For this reason, it was believed that the two significant correlations were a coincidence of the data set, and it was resolved that the seven selected resource allocation variables were appropriate variables for the subsequent analyses.

The results of the correlation analysis for the resource allocation variables defined as percentages of their respective resource allocation categories are listed in Table 14 on the following page. Once again, the first number in each set is the Pearson correlation coefficient while the second number is the probability under the null hypothesis of rho equaling zero. As can be seen by the bolded values, the resource allocation variables defined as percentages of their respective resource allocation categories were very heavily correlated. In fact, the only correlation that was not found to be significant by the 0.3 standard was the correlation between PCFUNDW (the percentage of the fund-raising category budget appropriated to women's sports) and PCRECRUITW (the percentage of the recruiting budget appropriated to women's sports), and even this correlation was fairly high (0.2777). This high degree of multicollinearity could have caused instability in the estimates of the second regression analysis.

After this preliminary examination of the data and the resource allocation variables was performed, tests to analyze the relationships among resource allocation patterns and gender proportionality in intercollegiate athletics were undertaken. These

Table 14 Correlation Analysis of the "PC" Resource Allocation Variables

	PCGIAW	PCFUNDW	PCRECRUITW	PCEQUIPW	PCTRAVLW	PCSALW	PCCAFW
PCGIAW		0.5396 0.0001	0.4272 0.0001	0.4989 0.0001	0.4870 0.0001	0.4651 0.0001	0.5126 0.0001
PCFUNDW			0.2777 0.0003	0.4701 0.0001	0.4248 0.0001	0.5704 0.0001	0.7282 0.0001
PCRECRUITW				0.6537 0.0001	0.5961 0.0001	0.5749 0.0001	0.4408 0.0001
PCEQUIPW					0.7870 0.0001	0.7206 0.0001	0.4166 0.0001
PCTRAVLW						0.6972 0.0001	0.4257 0.0001
PCSALW							0.4139 0.0001
PCCAFW							

analyses were conducted by examining the SAS listings generated through multiple regression and ANOVA techniques. The results of these analyses follow.

Determination of the Significance of the Mathematical Models

As was the case with the data and resource allocation variables in general, some preliminary tests on the mathematical models were performed to ensure that statistical assumptions were met before the models were analyzed. To test the validity of the data and the models, a plot of the predicted score versus the residuals was generated for each

model This plot tested for homoscedascity (the assumption of equal variances in the population), normality and curvilinearity of relationship

The resultant plots displayed points that were evenly distributed above and below a line drawn through zero on the vertical axis, and the spread of points did not increase or decrease across the horizontal axis Therefore the data was determined to be acceptably normal and homoscedastic for the purposes of these analyses Further, the plots for both models did not show any curvilinear trends, thus, the relationships in both instances were concluded to be linear

After these statistical assumptions were proven to be met, the first research question was considered whether or not the first mathematical model (the model comprised of the seven resource allocation variables as percentages of institutions' total athletic budgets) had a statistically significant effect on the dependent variable PROP, the gender proportionality present at each institution. The PROC GLM procedure in SAS was invoked to test this question, and the results are presented in Table 15

Table 15 Results of the Multiple Regression Analysis on the First Model

Source	DF	Sum of Squares	F Value	P Value
Model	7	1939 38	3 14	0 0030*
Error	439	38782 82		
Total	446	40722 19		
R Square	0 0476			

*significant at the p<=0 05 level

(Note Due to missing values, only 447 of the 473 observations could be used in this analysis.)

Since the p-value of 0 003 was less than 0 05, the null hypothesis was rejected and it was concluded that this first mathematical model provided a representation of the relationships between resource allocation patterns and gender proportionality at NCAA member institutions

Since the first mathematical model was significant, the next step was to determine the parameter estimates of each resource allocation variable in the model and to test individual hypotheses to determine if discrete statistically significant relationships were present between resource allocation variables and the gender proportionality variable PROP These parameter estimates and the results of individual hypotheses of predictive ability are presented in Table 16 on the following page

From the parameter estimates in Table 16, it was concluded that the first mathematical model could be represented as follows

PROP = 20.3340 - 0 0183PTGIAW - 0 9438PTFUNDW
- 0 8795PTRECRUITW - 0 3799PTEQUIPW- 0 1194PTTRAVLW
- 0 1706PTSALW + 0 7936PTCAPW

It was also concluded that the strongest individual predictor of gender proportionality in this set of resource allocation variables while controlling the effects of all other variables was PTSALW, the salary appropriated to coaches and staff of women's teams. Further, it was determined that PTSALW was the only resource allocation variable that had an individual statistically significant relationship with gender proportionality while controlling for all other variables

Therefore, while there was a tendency for all resource allocation variables to exhibit an inverse relationship with gender proportionality as expected (with the

Table 16 Parameter Estimates and Tests for Individual Significances in the First Model

Variable	DF	Parameter Estimate	T Value for H_0: Parameter = 0	P Value
Intercept	1	20 3340	18.22	0 0001
PTGIAW	1	-0 0183	-0 25	0 8052
PTFUNDW	1	-0 9438	-1 10	0 2726
PTRECRUITW	1	-0 8795	-1 59	0 1136
PTEQUIPW	1	-0 3799	-1 74	0 0825
PTTRAVLW	1	-0 1194	-0 82	0 4123
PTSALW	1	-0 1706	-2 05	0 0413*
PTCAPW	1	0 7936	1 15	0 2509

*significant at the p<=0 05 level

exception of the capital expenditures resource allocation variable), the only individual relationship that was interpretable was the relationship reported between PTSALW and PROP As the percentage of institutions' total athletic budgets appropriated toward salaries for the coaches and staff of women's sports increased, there was a tendency for PROP to decrease, or for the percentage difference between women in the undergraduate student population and female varsity athletes to decrease

The second research question was next considered The second question asked whether or not the second mathematical model comprised of the seven resource allocation variables as percentages of institutions' total budgets to each resource allocation category had a statistically significant effect on the dependent variable PROP The results of the second mathematical model are presented in Table 17 on the following page

Since the p-value of 0 4398 was greater than 0 05, the null hypothesis failed to be rejected and it was concluded that this group of resource allocation variables was not

Table 17 Results of the Multiple Regression Analysis on the Second Model

Source	DF	Sum of Squares	F Value	P Value
Model	7	360 28	1 02	0 4398
Error	26	1309 98		
Total	33	1670 26		
R Square	0 2157			

(Note Due to missing values, only 34 of the 473 observations could be used in this analysis.)

significantly related to gender proportionality in this particular study It was concluded that this mathematical model did not serve as a representation of the relationships between resource allocation patterns and gender proportionality at NCAA member institutions based upon the data reported in the 1992-93 NCAA Financial Survey

It is important to note that only 34 of the 473 institutional data sets could be used in this analysis Due to the frame of reference of the variables in this model (the percent of the appropriation to a particular resource allocation category granted to women's sports), mathematically unallowable divisions by zero frequently resulted, causing data points to be eliminated from this particular analysis. In other words, institutions frequently did not appropriate any money to a resource allocation category resulting in a zero in the denominator of the calculation for that resource allocation variable For example, since Division III institutions cannot grant scholarships, the calculation for PCGIAW for these institutions was as follows·

PCGIAW = GIAW / (GIAW + GIAM + GIAA) = 0 / 0 (an illegal calculation)

The resultant number of data points for each variable are reported in Table 18

Table 18 Data Points for Each "Percent of Category" Resource Allocation Variable

Variable	Data Points
PCGIAW	304
PCFUNDW	170
PCRECRUITW	400
PCEQUIPW	447
PCTRAVLW	449
PCSALW	446
PCCAPW	85

In addition, institutions reporting no appropriation in any one of these seven resource allocation categories had to be eliminated from this analysis due to the incomplete institutional data sets that resulted. Since only 34 institutions were found to have valid data on all seven variables, the data set for this analysis was composed of only 34 observations

In summary, the second model was not found to be statistically significant. However, since the analysis was run with less than a 5-to-1 observation to variable ratio, it is very likely that these results contained a serious bias Due to its lack of predictive ability no further data analyses were performed on the results of this model

Determination of the Relationships Between Individual Resource Allocation Variables and the Categories of Gender Proportionality

Analysis of variance tests were executed to analyze relationships between resource allocation patterns and gender proportionality that could not be identified through the regression analyses As mentioned previously, the first categorical variable, CATPROP, was created to test for significant differences in resource allocation variables

between the three categories of gender proportionality currently found at NCAA member institutions This third research question asked whether or not any of the seven resource allocation variables expressed as percentages of institutions' total athletic budgets or any of the seven resource allocation variables expressed as percentages of the institutions' budgets to each resource allocation category were significantly related to the category of gender proportionality observed at those institutions The continuous gender proportionality data used in the regression analyses, PROP, were converted into categorical data with the goal of identifying relationships that could potentially help non-proportionate and borderline proportionate institutions move into the substantially proportionate category

ANOVA techniques were used to check for the existence of significant difference(s) between the means of the three categories of gender proportionality on each of the seven resource allocation variables because this analysis technique was believed to be the best statistical test available due to the categorical nature of CATPROP The results obtained from these analyses between the "percent of total" resource allocation variables and the categories of gender proportionality are reported in Table 19 on the following page

As can be seen from Table 19, the only test where a significant difference between the means of the gender proportionality categories was found to exist was on the resource allocation variable PTTRAVLW, the percent of institutions' total budgets appropriated toward travel for women's sports Such a result would indicate that the percentage of the total budget allocated for the travel of women's sports teams was significantly different

Table 19 ANOVA Tests Between the Categories of Gender Proportionality and Each "PT" Resource Allocation Variable

Variable	Source	DF	Sum of Squares	F Value	P Value
PTGIAW					
	Model	2	10 41	0 12	0 8873
	Error	466	20274 34		
	Total	468	20284 75		
	R Square		0 0005		
PTFUNDW					
	Model	2	0 04	0 04	0 9561
	Error	466	201 35		
	Total	468	201 39		
	R Square		0 0002		
PTRECRUITW					
	Model	2	3 48	2 51	0 0826
	Error	466	323 75		
	Total	468	327 23		
	R Square		0 0106		
PTEQUIPW					
	Model	2	36.21	1 70	0 1845
	Error	466	4973 65		
	Total	468	5009 86		
	R Square		0 0072		
PTTRAVLW					
	Model	2	122 20	3 63	0 0273*
	Error	466	7848 95		
	Total	468	7971 15		
	R Square		0 0153		
PTSALW					
	Model	2	21 55	0 12	0 8884
	Error	466	42433 26		
	Total	468	42454 82		
	R Square		0 0005		
PTCAPW					
	Model	2	0 39	0 48	0 6199
	Error	466	191 35		
	Total	468	191 75		
	R Square		0 0021		

*significant at the p<=0 05 level

(Note Due to missing values, only 469 of the 473 observations could be used)

between at least two of the gender proportionality categories currently found at NCAA member institutions. Therefore, a Bonferroni post hoc test was performed to determine which pair of means significantly differed from one another on PTTRAVLW. The results of the post hoc test are reported in Table 20.

Table 20. Post Hoc Test Between the Categories of Gender Proportionality and the "PT" Resource Allocation Variable

Comparison	Lower Confidence Limit	Upper Confidence Limit	Difference Between Means
NP - BP	-1.82	0.28	-0.77
BP - SP	-2.93	0.99	-0.97
NP - SP	-3.57	0.09	-1.74

(Note: Comparisons significant at the 0.05 level are indicated by '***'.)

Table 20 reports that no pairwise comparisons proved significant. In other words, although the ANOVA test found a significant difference between PTRAVLW and CATPROP, the conservative nature of the Bonferroni follow-up test did not conclude this difference to be significant. As mentioned previously, the Bonferroni test, in its attempt to control the experimentwise error rate, reduces the alpha level needed to establish significance by dividing by the number of comparisons. The Bonferroni test was used in this analysis despite the fact that the Type II error rate tends to be relatively high because of its rigor in establishing true differences.

Table 10 listed the means for the categories of gender proportionality on PTTRAVLW. The largest mean difference occurred between the non-proportionate

institutions, designating an average of 3 56 percent of their total budgets to travel for women's teams, and the substantially proportionate institutions, designating an average of 5 30 percent of their total budgets to this resource allocation category Thus this mean difference which was large enough to be significant in the ANOVA analysis, could provide some useful insight despite the fact that it was not a strong enough relationship for the Bonferroni test to prove significant. However, the null hypothesis failed to be rejected for the first set of resource allocation variables

The null hypothesis was then tested for the second set of resource allocation variables The results obtained from running an ANOVA on the categories of gender proportionality and each of the seven resource allocation variables expressed as percentages of institutions' total appropriations to a resource allocation category are presented in Table 21 oo the following page

Before post hoc tests oo the three significant ANOVA analyses are discussed, two important points must be mentioned First, special attention should be drawn to the degrees of freedom listed for each ANOVA in the above table. As was described with regard to the second regressioo model, the frame of reference of the variables in this set of ANOVA analyses (the percent of institutions' appropriations to a particular resource allocation category that went toward women s sports), mathematically unallowable divisions by zero frequently resulted causing data points to be eliminated

Recall that only 34 institutions were found to have valid data on all seven variables therefore, only 34 data sets could be used in the second regresston model However, since each ANOVA test was independent of all other tests, it did not matter

Table 21 ANOVA Tests Between the Categories of Gender Proportionality and Each "PC" Resource Allocation Variable

Variable	Source	DF	Sum of Squares	F Value	P Value
PCGIAW					
	Model	2	1806 18	5 43	0 0048*
	Error	301	50093 98		
	Total	303	51900 16		
	R Square		0 0348		
PCFUNDW					
	Model	2	107 20	0 11	0 8915
	Error	167	77888 01		
	Total	169	77995 21		
	R Square		0 0014		
PCRECRUITW					
	Model	2	2015 17	3 37	0 0354*
	Error	397	118679 64		
	Total	399	120694 81		
	R Square		0 0167		
PCEQUIPW					
	Model	2	2853 85	4 45	0 0122*
	Error	444	142383 57		
	Total	446	145237 41		
	R Square		0 0197		
PCTRAVLW					
	Model	2	459 15	0 90	0 4083
	Error	446	114081 00		
	Total	448	114540 15		
	R Square		0 0040		
PCSALW					
	Model	2	68 88	0 14	0 8691
	Error	443	108701 61		
	Total	445	108770 49		
	R Square		0 0006		
PCCAPW					
	Model	2	502 53	0 48	0 6215
	Error	82	43069 73		
	Total	84	43572 26		
	R Square		0 0115		

*significant at the p<=0 05 level

whether or not the institutional data sets were complete, the ANOVA tests were conducted with as many data points as were meaningful for each resource allocation variable. Therefore, the number of data points in each analysis was the number of useable data points for each resource allocation variable. For this reason, the degrees of freedom for each resource allocation variable varied between analyses since the degrees of freedom were based upon the number of meaningful data points. Refer to Table 18 for a listing of the number of useable data points for each resource allocation variable.

Secondly, special attention should be drawn to the fact that PCCAPW, the percent of the capital expenditures budget appropriated to women's sports, and PCFUNDW, the percent of the fund-raising budget appropriated to women's sports, were analyzed with less than half of the number of data points that most of the other variables contained in their analyses. Although analyses on these variables were still well above the recommended minimum 5-to-1 observation to variable ratio, it should be noted that these results could potentially have been less accurate than the others due to the large number of missing observations.

As can be seen from Table 21, three ANOVA tests resulted in significant p-values for the second set of resource allocation variables: PCGIAW (the percent of the grants-in-aid budget appropriated to female athletes), PCRECRUITW (the percent of the recruiting budget appropriated to women's sports), and PCEQUIPW (the percent of the equipment budget appropriated to women's sports). Therefore, the null hypothesis was rejected, and it was concluded that the percentage of the total appropriation to the grants-in-aid recruiting/scouting, and equipment resource allocation categories granted to women's

sports teams was significantly related to the gender proportionality category observed at NCAA member institutions. Since these significances were found, Bonferroni post hoc tests were once again performed to determine which pair of means significantly differed from one another on these three resource allocation variables. The results of the post hoc are presented in Table 22.

Table 22. Post Hoc Tests Between the Categories of Gender Proportionality and "PC" Resource Allocation Variables

Variable	Comparison	Lower Confidence Limit	Upper Confidence Limit	Mean Difference
PCGIAW				
	NP - BP	-10.30	-1.35	-5.83 ***
	BP - SP	-8.19	10.22	1.01
	NP - SP	-13.36	3.74	-4.81
PCRECRUITW				
	NP - BP	-9.31	0.35	-4.48
	BP - SP	-10.13	7.60	-1.27
	NP - SP	-14.00	2.51	-5.74
PCEQUIPW				
	NP - BP	-7.73	1.65	-3.04
	BP - SP	-14.99	2.39	-6.30
	NP - SP	-17.46	-1.22	-9.34 ***

(Note: Comparisons significant at the 0.05 level are indicated by '***')

For the resource allocation variable PCGIAW, one significant difference was found; there was a significant relationship between the percent of the grants-in-aid budget allotted to women and two categories of gender proportionality. This difference occurred between the means of the non-proportional (31.25 percent) and the borderline proportional (37.07 percent) groups. In other words, the borderline proportional group of

institutions gave a significantly higher percentage of their grants-in-aid budget to women than did the non-proportional group of institutions. The substantially proportional group of institutions, on the other hand, gave a slightly lower percentage of their grants-in-aid budget to women (36.06 percent) than did the borderline proportional institutions, a mean percentage that was not significantly different from either of the other two groups.

For the resource allocation variable PCRECRUITW, no pairwise comparisons proved significant. Once again, this may have been because the Bonferroni test, in its attempt to control the experimentwise error rate, reduces the alpha level needed to establish significance by dividing by the number of comparisons. Therefore, although the largest mean difference was found between the non-proportional (25.59 percent of the recruiting/scouting budget goes to women's sports) and substantially proportional (31.34 percent to women's sports) gender proportionality groups, the difference was not large enough to found significant by the Bonferroni post hoc test.

Lastly, a significant difference was found between the non-proportional (25.23 percent of the category budget) and substantially proportional (34.57 percent of the category budget) gender proportionality groups on the resource allocation variable PCEQUIPW. In other words, the substantially proportional group of institutions gave a significantly higher percentage of their equipment budgets to women than did the non-proportional group of institutions.

In summary, the null hypothesis for the third research question was rejected, and two resource allocation variables expressed as percentages of institutions' resource

allocation category budgets were significantly different between at least two gender proportionality categories found at NCAA member institutions

Determination of the Relationships Between Individual Resource Allocation Variables and the NCAA Divisional Levels

The second categorical variable, DIVISION, was created to analyze the relationships between resource allocation patterns and gender proportionality in intercollegiate athletics by testing for significant differences in resource allocation variables between the three primary divisional levels of the NCAA. This fourth research question asked whether or not any of the seven resource allocation variables in either frame of reference were significantly related to the NCAA divisional level of member institutions. As mentioned previously, these analyses were performed in an attempt to provide more insight into the specific relationships between resource allocation patterns and gender proportionality in intercollegiate athletics. It was believed that in order to more fully understand the relationships between resource allocation patterns and gender proportionality, an understanding of the differences in resource allocation patterns between the major divisional levels of the NCAA must be attained. Further, understanding these differences could potentially help NCAA member institutions identify which results and recommendations are most pertinent to institutions similar to their own.

ANOVA tests were used to check for the existence of significant difference(s) between the mean appropriations of institutions in the three primary NCAA divisional levels on each of the seven independent variables. The results obtained from running

Table 23 ANOVA Tests Between the NCAA Divisional Levels and Each "PT" Resource Allocation Variable

Variable	Source	DF	Sum of Squares	F Value	P Value
PTGIAW					
	Model	2	9208.77	193 72	0 0001*
	Error	466	11075.97		
	Total	468	20284 75		
	R Square		0 4540		
PTFUNDW					
	Model	2	1.05	1.23	0.2942
	Error	466	200 34		
	Total	468	201 39		
	R Square		0 0052		
PTRECRUITW					
	Model	2	5 54	4 01	0 0187*
	Error	466	321 69		
	Total	468	327.23		
	R Square		0 0169		
PTEQUIPW					
	Model	2	1016 32	59 30	0 0001*
	Error	466	3993 54		
	Total	468	5009 86		
	R Square		0 2029		
PTTRAVLW					
	Model	2	1106 31	37.55	0 0001*
	Error	466	6864 83		
	Total	468	7971 15		
	R Square		0 1388		
PTSALW					
	Model	2	5960 44	38 05	0 0001*
	Error	466	36494.37		
	Total	468	42454 82		
	R Square		0 1404		
PTCAPW					
	Model	2	0 01	0 01	0 9942
	Error	466	191 74		
	Total	468	191 75		
	R Square		0 00002		

*significant at the p<=0 05 level
(Note Due to missing values, only 469 of the 473 observations could be used in this analysis)

ANOVA analyses on the three primary NCAA divisional levels and each of the seven resource allocation variables expressed as percentages of the total athletic budget are presented in Table 23

Five ANOVA tests resulted in significant p-values PTGIAW (grants-in-aid) PTRECRUITW (recruiting), PTEQUIPW (equipment), PTTRAVLW (travel), and PTSALW (salary) Therefore, the null hypothesis was rejected and it was concluded that there were significant differences across divisional levels on these variables Further, it could be concluded that the mean percentages of the total budget appropriated toward grants-in-aid for women, recruiting/scouting for women's teams equipment for women's teams, travel for women's teams, and salaries for coaches and staff of women's sports were significantly different at institutions in at least two NCAA divisional levels Since these significances were found, Bonferroni post hoc tests were performed to determine which pair of means significantly differed from one another on these five resource allocation variables. The results of the post hoc tests are presented in Table 24 on the following page

For the resource allocation variable PTGIAW, significant differences were found between the means of all three pairwise comparisons In other words, a significantly different mean percentage of the total budget was allotted toward grants-in-aid for women at all three NCAA divisional levels Division II institutions tended to allot the highest percentage of their total budgets (10 86 percent) to grants-in-aid for women, and this mean allotment was significantly higher than the mean allotment for women's grants-in-aid at Division I institutions (8 14 percent of the total budget) Division III institutions

Table 24 Post Hoc Tests Between the NCAA Divisional Levels and "PT" Resource Allocation Variables

Variable	Comparison	Lower Confidence Limit	Upper Confidence Limit	Mean Difference	
PTGIAW					
	I - II	-4 11	-1 34	-2 73	***
	II - III	9 41	12 31	10 86	***
	I - III	6.89	9 39	8 14	***
PTRECRUITW					
	I - II	-0 11	0 36	0 12	
	II - III	-0 53	-0 04	-0 29	***
	I - III	-0 38	0 05	-0 16	
PTEQUIPW					
	I - II	-1 43	0 23	-0.60	
	II - III	-3 57	-1 83	-2.70	***
	I - III	-4 05	-2 55	-3.30	***
PTTRAVLW					
	I - II	-1 92	0.26	-0 83	
	II - III	-3 79	-1 51	-2 65	***
	I - III	-4 46	-2.50	-3 48	***
PTSALW					
	I - II	-4 12	0 90	-1 61	
	II - III	-9 03	-3 78	-6 41	***
	I - III	10.28	-5 75	-8 01	***

(Note Comparisons significant at the 0.05 level are indicated by '***')

did not grant athletic scholarships, therefore, the mean percentage of their total athletic budget allotted to grants-in-aid for women was zero, which was significantly less than the means of Divisions I and II.

For the resource allocation variable PTRECRUITW, the mean difference between the percentages of the total budget allotted toward recruiting/scouting for women's teams at Divisions II and III was significant. Division III institutions tended to allot the highest percentage of their total budgets to recruiting/scouting for women's teams (0 73 percent)

while Division II institutions tended to allot the lowest percentage of their total budgets to this resource allocation category (0 45 percent of the total budget) Division I institutions allotted a slightly greater percentage of their total budgets to recruiting/scouting for women's teams (0 57 percent) than did Division II institutions, however, mean differences between Divisions I and III and between Divisions I and II were not large enough to be deemed significant by the Bonferroni tests

For the resource allocation variables PTEQUIPW, PTTRAVLW, and PTSALW Divisions I and II were fairly similar in the average percentages of institutions' total budgets allotted toward equipment and travel for women's teams and salaries for women's coaches and staff (0 88 percent versus 1 48 percent for PTEQUIPW 2 52 percent versus 3 35 percent for PTTRAVLW, and 5 32 percent versus 6 93 percent for PTSALW) However, Division III institutions on the average tended to allot a much greater percentage of their total athletic budgets to these resource allocation categories (4 17 percent for PTEQUIPW, 6 00 percent for PTTRAVLW and 13 34 percent for PTSALW) Therefore, the pairwise comparisons between Divisions I and III and between Divisions II and III were significant on all three resource allocation variables, while the comparisons between Divisions I and II were not significant.

The null hypothesis was then tested for the second set of resource allocation variables The results obtained from running ANOVA analyses on divisional level and each of the seven variables expressed as percentages of the total appropriation to a resource allocation category are reported in Table 25 on the following page

Table 25 ANOVA Tests Between the NCAA Divisional Levels and Each "PC" Resource Allocation Variable

Variable	Source	DF	Sum of Squares	F Value	P Value
PCGIAW					
	Model	2	4059 40	12 77	0 0001*
	Error	301	47840 76		
	Total	303	51900 16		
PCFUNDW					
	Model	2	9088 57	11 01	0 0001*
	Error	167	68906 64		
	Total	169	77995 21		
	R Square		0 1165		
PCRECRUITW					
	Model	2	8947 69	15 89	0 0001*
	Error	397	111747 12		
	Total	399	120694 81		
	R Square		0 0741		
PCEQUIPW					
	Model	2	16797 63	29 03	0 0001*
	Error	444	128439 78		
	Total	446	145237 41		
	R Square		0 1157		
PCTRAVLW					
	Model	2	11997 79	26 09	0 0001*
	Error	446	102542 36		
	Total	448	114540 15		
	R Square		0 1047		
PCSALW					
	Model	2	14081 15	32 94	0 0001*
	Error	443	94689 33		
	Total	445	108770 49		
	R Square		0 1295		
PCCAPW					
	Model	2	7255 35	8 19	0 0006*
	Error	82	36316 91		
	Total	84	43572 26		
	R Square		0 1665		

*significant at the p<=0 05 level

As can be seen from Table 25, all seven ANOVA tests resulted in significant p-values Therefore, the null hypothesis for this set of resource allocation variables was rejected, and it was concluded that the mean percentages of institutions' total budgets appropriated toward grants-in-aid for women, fund-raising for women's teams, recruiting/scouting for women's teams, equipment for women's teams, travel for women's teams, salaries for the coaches and staff of women's sports, and capital expenditures for women's sports were all significantly different between at least two NCAA divisional levels. The results of the post hoc tests are presented in Table 26 on the following page

On the resource allocation variable PCGIAW, Divisions I and II were similar in the percentages of their category budgets that were devoted to women (31 75 percent versus 35.25 percent) These differences were not significant in the Bonferroni post hoc analysis However, recall that Division III does not grant scholarships, therefore, the zero percent that resulted was significantly less than the allotted percentages at Divisions I and II

On the resource allocation variable PCFUNDW, Divisions I and III were found to be significantly different in the percentages of their category budgets allocated to fund-raising for women's sports Division I institutions on average allocated the lowest percentage of their category budgets to their women's programs (5 85 percent), while Division III institutions allocated the highest percentage (26 79 percent of the category budget) Division II institutions were in the middle (15.29 percent allocated to women's

Table 26 Post Hoc Tests Between the NCAA Divisional Levels and "PC" Resource Allocation Variables

Variable	Comparison	Lower Confidence Limit	Upper Confidence Limit	Mean Difference	
PCGIAW					
	I - II	-7.18	0.18	-3.50	
	II - III	17.48	53.03	35.25	***
	I - III	14.10	49.41	31.75	***
PCFUNDW					
	I - II	-18.95	0.06	-9.44	
	II - III	-24.87	1.87	-11.50	
	I - III	-32.39	-9.50	-20.94	***
PCRECRUITW					
	I - II	-11.37	-1.16	-6.26	***
	II - III	-10.34	0.97	-4.68	
	I - III	-15.71	-6.19	-10.95	***
PCEQUIPW					
	I - II	-10.11	-0.20	-5.15	***
	II - III	-14.22	-3.73	-8.97	***
	I - III	-18.59	-9.67	-14.13	***
PCTRAVLW					
	I - II	-10.72	-1.91	-6.32	***
	II - III	-10.24	-0.88	-5.56	***
	I - III	-15.85	-7.90	-11.88	***
PCSALW					
	I - II	-10.50	-2.08	-6.29	***
	II - III	-11.34	-2.25	-6.79	***
	I - III	-16.97	-9.20	-13.08	***
PCCAPW					
	I - II	-31.47	-2.86	-17.16	***
	II - III	-22.68	14.45	-4.12	
	I - III	-36.70	-5.85	-21.28	***

(Note Comparisons significant at the 0.05 level are indicated by '***')

sports) reporting a mean that was not significantly different from that of Division I nor Division III.

On the resource allocation variables PCRECRUITW and PCCAPW, Divisions II and III were similar in their percentage allocations to women while Division I was significantly lower For this reason, the percentage difference was not found to be significant between Divisions II and III (28 84 percent versus 33 52 percent for PCRECRUITW, and 22 66 percent versus 26 78 percent for PCCAPW) However, the percentage difference of both Divisions II and III with Division I (22.58 percent for PCRECRUITW and 5.50 percent for PCCAPW) was found to be significant

For the last three resource allocation variables (PCEQUIPW, PCTRAVLW, and PCSALW), all three pairwise comparisons proved significant. All mean percentage allocations for PCEQUIPW (20 86 for Division I, 26 01 for Division II, and 34 99 for Division III), for PCTRAVLW (29 84 for Division I, 36 16 for Division II and 41 72 for Division III), and for PCSALW (15 62 for Division I, 21 91 for Division II and 28 70 for Division III) were large enough to be significant in the Bonferroni tests

In summary, the null hypothesis for the fourth research question was rejected, and five resource allocation variables expressed as percentages of institutions' total budgets and seven resource allocation variables expressed as percentages of institutions' resource allocation category budgets were significantly different at at least two divisional levels of the NCAA

Determination of the Relationships Between Individual Resource Allocation Variables and the Football Statuses of NCAA Member Institutions

The final categorical variable, FTBALL, was created to analyze the relationships between resource allocation patterns and gender proportionality in intercollegiate

athletics by testing for significant differences in resource allocation variables between NCAA institutions that sponsored football as one of their varsity sports and those that did not. The fifth research question asked whether or not any of the seven resource allocation variables in either frame of reference were significantly related to the football status of NCAA member institutions. It was believed that an understanding of the differences in resource allocation patterns between football sponsoring and non-sponsoring institutions was important due to the large impact football has on the gender equity equation. The results obtained from these analyses are presented in Table 27 on the following page.

Once again, five ANOVA tests resulted in significant p-values: PTFUNDW (fund-raising), PTRECRUITW (recruiting), PTEQUIPW (equipment), PTTRAVLW (travel), and PTSALW (salary). Therefore, the null hypothesis was rejected, and it was concluded that there were significant differences in the percentages of institutions' total athletic budgets allocated to women on these variables between football sponsoring and non-sponsoring institutions. The mean percent allocations for PTFUNDW (0.08 percent for football institutions versus 0.23 percent for non-football institutions), for PTRECRUITW (0.54 percent versus 0.73 percent), for PTEQUIPW (1.44 percent versus 4.40 percent), for PTTRAVLW (3.02 percent versus 6.32 percent), and for PTSALW (6.65 percent versus 14.11 percent) were different enough to be significant by the ANOVA analyses.

It is important to note that four of these five resource allocation variables were the same variables that were significant in the analyses by divisional level. Only the first variable was different with PTFUNDW being identified as significant in these analyses as

Table 27 ANOVA Tests Between Football Statuses and Each "PT" Resource Allocation Variable

Variable	Source	DF	Sum of Squares	F Value	P Value
PTGIAW					
	Model	1	34 94	0 90	0.3444
	Error	421	16414 50		
	Total	422	16449 44		
	R Square		0 0021		
PTFUNDW					
	Model	1	1 96	4 41	0 0363*
	Error	421	186 82		
	Total	422	188 78		
	R Square		0 0104		
PTRECRUITW					
	Model	1	2 99	3 99	0 0463*
	Error	421	314 88		
	Total	422	317 86		
	R Square		0 0094		
PTEQUIPW					
	Model	1	713 88	71 62	0 0001*
	Error	421	4196 57		
	Total	422	4910 45		
	R Square		0 1454		
PTTRAVLW					
	Model	1	885 20	59 07	0 0001*
	Error	421	6308 77		
	Total	422	7193 97		
	R Square		0 1230		
PTSALW					
	Model	1	4531.55	51 04	0 0001*
	Error	421	37378 96		
	Total	422	41910 52		
	R Square		0 1081		
PTCAPW					
	Model	1	0 07	0 19	0 6628
	Error	421	145 41		
	Total	422	145 48		
	R Square		0 0005		

*significant at the p<=0 05 level

(Note Due to missing values only 423 of the 473 observations could be used in this analysis)

opposed to PTGIAW being found significant in the analyses by divisional level. Further, since only two groups were compared in this set of analyses, Bonferroni tests were not required to determine where the significant differences occurred.

The null hypothesis was then tested for the second set of resource allocation variables. The results obtained from the ANOVA analyses on football sponsoring and non-sponsoring institutions and each of the seven resource allocation variables expressed as percentages of institutions' total appropriations to a resource allocation category are presented in Table 28 on the following page.

As reported in Table 28, analyses on all seven resource allocation variables proved significant. The mean percent allocations for FCGIAW (28.13 percent for football institutions versus 44.85 percent for non-football institutions), for PCFUNDW (7.50 percent versus 24.43 percent), for PCRECRUITW (22.68 percent versus 42.65 percent), for PCEQUIPW (20.55 percent versus 44.12 percent), for PCTRAVLW (30.46 percent versus 49.16 percent), for PCSALW (17.50 percent versus 33.09 percent), and for PCCAPW (10.04 percent versus 31.43 percent) were different enough to be significant.

In summary, the null hypothesis for the fifth research question was rejected, and five resource allocation variables expressed as percentages of institutions' total budgets and seven resource allocation variables expressed as percentages of institutions' resource allocation category budgets were significantly different between NCAA member institutions that sponsored football and those that did not sponsor football.

Table 28 ANOVA Tests Between Football Statuses and Each "PC" Resource Allocation Variable

Variable	Source	DF	Sum of Squares	F Value	P Value
PCGIAW					
	Model	1	9443 49	69 98	0 0001*
	Error	256	34546 89		
	Total	257	43990 37		
	R Square		0.2147		
PCFUNDW					
	Model	1	5521 14	12 86	0 0005*
	Error	140	60089 98		
	Total	141	65611 13		
	R Square		0 0842		
PCRECRUITW					
	Model	1	24491 55	94 20	0 0001*
	Error	353	91778 59		
	Total	354	116270 15		
	R Square		0 2106		
PCEQUIPW					
	Model	1	41988 82	175 50	0 0001*
	Error	399	95459.28		
	Total	400	137448 10		
	R Square		0 3055		
PCTRAVLW					
	Model	1	25928 97	127 36	0 0001*
	Error	401	81638 58		
	Total	402	107567 55		
	R Square		0 2410		
PCSALW					
	Model	1	17736 71	79 94	0 0001*
	Error	398	88301 05		
	Total	399	106037 77		
	R Square		0 1673		
PCCAPW					
	Model	1	3995 11	8.23	0 0053*
	Error	77	37393 10		
	Total	78	41388 21		
	R Square		0 0965		

*significant at the p<=0 05 level

Summary

This study developed and analyzed mathematical models to explain the relationships among resource allocation patterns and gender proportionality in intercollegiate athletics using two different frames of reference. The study also analyzed the relationships between individual resource allocation variables believed to play a significant role in achieving gender proportionality and three categories of gender proportionality, three divisional levels, and football status currently found at NCAA member institutions. The first mathematical model resulted in a rejection of the null hypothesis. It was concluded that this first model served as a representation of the relationships between resource allocation patterns and gender proportionality at NCAA member institutions. The only independent variable that had a significant individual relationship with gender proportionality was the percentage of the total athletic budget appropriated toward salaries for the coaches and staff of women's sports teams. The gender proportionality was concluded to improve (the difference between percentages was concluded to decrease) as the percentage of institutions' total budgets appropriated toward salaries for the coaches and staff of women's teams increased.

With regard to the second mathematical model, the null hypothesis failed to be rejected and it was concluded that this mathematical model did not serve as a good representation of the relationships between resource allocation patterns and gender proportionality at NCAA member institutions. However, only 34 observations could be used in this analysis.

In the ANOVA analyses on the three categories of gender proportionality currently found at NCAA member institutions, the only test where a significant difference was found to exist for resource allocation variables expressed as percentages of institutions' total athletic budgets was in the analysis of PTTRAVLW. However, no pairwise comparisons proved significant. Three ANOVA tests resulted in significant p-values for resource allocation variables expressed as percentages of institutions' total appropriations to a resource allocation category: PCGIAW, PCRECRUITW, and PCEQUIPW. In the Bonferroni analysis for PCGIAW, a significant difference was found to exist between the means of the non-proportional and the borderline proportional groups. For the resource allocation variable PCRECRUITW, no pairwise comparisons proved significant. Lastly, a significant difference was found between the non-proportional and substantially proportional gender proportionality groups on the resource allocation variable PCEQUIPW.

Five ANOVA tests resulted in significant p-values for the analyses of resource allocation variables expressed as percentages of institutions' total athletic budgets and NCAA divisional level: PTGIAW, PTRECRUITW, PTEQUIPW, PTTRAVLW, and PTSALW. For the resource allocation variable PTGIAW, a significant difference was found between the means of all three pairwise comparisons. For the resource allocation variable PTRECRUITW, the mean difference between Divisions II and III was found to be significant. For PTEQUIPW, PTTRAVLW, and PTSALW, the pairwise comparisons between Divisions I and III and between Divisions II and III were found to be significant. With regards to the second set of resource allocation variables, PCGIAW was

significantly different between Divisions I and III and between Divisions II and III, PCFUNDW was significantly different between Divisions I and III, PCRECRUITW and PCCAPW were significantly different between Divisions I and II and between Divisions I and III, and PCEQUIPW, PCTRAVLW, and PCSALW were significantly different on all pairwise comparisons

Lastly, in the analyses of resource allocation variables and football status of NCAA member institutions, five ANOVA tests resulted in significant p-values when percentages were expressed in terms of institutions' total athletic budgets PTFUNDW PTRECRUITW, PTEQUIPW, PTTRAVLW, and PTSALW All seven ANOVA analyses proved significant when resource allocation variables were expressed as percentages of institutions' category budgets

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

Introduction

The purpose of this study was to develop and analyze mathematical models to explain the relationships among resource allocation patterns and gender proportionality in intercollegiate athletics using two different frames of reference. A further purpose was to study the relationships between individual resource allocation variables believed to play a significant role in achieving gender proportionality and three categories of gender proportionality, three divisional levels, and the football status of NCAA member institutions

The first mathematical model related seven resource allocation variables expressed as percentages of institutions' total athletic budgets to the gender proportionality observed at those institutions The resource allocation variables comprising this model were PTGIAW, PTFUNDW, PTRECRUITW, PTEQUIPW, PTTRAVLW, PTSALW, and PTCAPW These represented the percentages of institutions' total athletic budgets appropriated toward grants-in-aid, fund-raising, recruiting, equipment, travel, salaries, and capital expenditures, respectively, for women's sports. The resource allocation variables were related to the gender proportionality variable, PROP, defined as the difference between the percentage of women in

institutions' undergraduate student populations and the percentage of female varsity athletes at those institutions.

The second mathematical model related the same seven resource allocation variables to the gender proportionality variable, PROP, however, the resource allocation variables were defined with regard to a different frame of reference. The seven resource allocation variables in the second model were PCGIAW, PCFUNDW, PCRECRUITW, PCEQUIPW, PCTRAVLW, PCSALW, and PCCAPW, defined as the percentage of institutions' total appropriations to the grants-in-aid, fund-raising, recruiting, equipment, travel, salary, and capital expenditures resource allocation categories, respectively, appropriated to women's sports. The mathematical models created to test if there were significant relationships between resource allocation patterns and gender proportionality in intercollegiate athletics were analyzed through the use of multiple regression techniques with the Statistical Analysis System (SAS) on the University of Florida's mainframe.

Further analyses were performed on the seven resource allocation variables defined in terms of both frames of reference and the three categorical variables CATPROP, DIVISION, and FTBALL. These variables represented the three gender proportionality groupings, the three major NCAA divisional levels, and the football status of NCAA member institutions. Analysis of variance techniques were used to test for significant relationships between resource allocation variables and these three categorical variables with the goal of identifying significant relationships between resource allocation patterns and gender proportionality that could not be identified in the regression analyses

The first mathematical model was significant with one individually significant resource allocation variable, PTSALW, the percentage of institutions' total athletic budgets appropriated toward salaries for coaches and staff of women's sports The second mathematical model was not significant and was determined not to represent the resource allocation/gender proportionality relationships present in intercollegiate athletics. All three sets of analyses on the gender proportionality, divisional level, and football status categorical variables identified significant relationships between these variables and resource allocation patterns, however, the resource allocation variables identified to have the strongest relationships across analyses were not the variables expected, and several relationships warranted further study A discussion of all analyses as well as the conclusions that were drawn from the study and suggestions for further research are presented in this chapter

Discussion of the First Mathematical Model

Performing a multiple regression analysis on the first mathematical model resulted in a p-value of 0 003 This represented a significant finding, and it was concluded that this first mathematical model, represented by the equation

PROP = 20 3340 - 0 0183PTGIAW - 0 9438PTFUNDW
- 0 8795PTRECRUITW - 0 3799PTEQUIPW- 0 1194PTTRAVLW
- 0 1706PTSALW + 0 7936PTCAPW

served as a representation of the relationships between resource allocation patterns and gender proportionality at NCAA member institutions (refer to Chapter 4) This result was expected since it was hypothesized that these seven resource allocation variables

would have an affect on the degree of gender proportionality achieved by an athletic program.

In the initial discussion of the model, all resource allocation variables were expected to be inversely related to gender proportionality, it was hypothesized that as the percentage of the total athletic budget appropriated toward each women's resource allocation category increased, the discrepancy between the female undergraduate percentage and the female athlete percentage would diminish. Although there was a tendency for most resource allocation variables to exhibit an inverse relationship with gender proportionality, it was determined that the resource allocation variable representing the salaries paid for women's sports was the only variable that was able to be interpreted on an individual basis with respect to its impact on gender proportionality. This was the case because PTSALW, the percentage of institutions' total athletic budgets appropriated toward salaries for the coaches and staff of women's sports teams, was the only resource allocation variable that was statistically significant with gender proportionality controlling for the other variables in the model.

Possible explanations for the significant relationship between PTSALW and PROP are as follows: 1) In general, the better the gender proportionality at an institution, the greater the percentage of athletes at that institution who are female. A larger percentage of female athletes could mean that a larger percentage of the coaches and athletic staff serve women's sports. Subsequently, a higher percentage of coaches and athletic staff serving women's sports could result in a greater percentage of the total budget dedicated to PTSALW. However, it should be noted that other variables to which

the same reasoning could be applied were ant found to be individually significant in the prediction of PROP 2) This relationship could also be explained if, by increasing the salary paid to women's coaches and staff, an institution attracts more qualified applicants who are dedicated to fostering and nurturing the women's athletic program at their respective institutions

Although a relationship between the salaries paid to coaches and staff of women's teams and the degree of gender proportionality observed at NCAA member institutions was found to exist, caution should be used in assuming that greater appropriations to this resource allocation variable will result in an improved degree of gender proportionality There exists the possibility that institutions that appropriated a higher percentage of their total athletic budgets to this resource allocation category had commitments to gender proportionality in their athletic programs This observed relationship between PTSALW and PROP may be more indicative of the overall attitudes and values of institutions to gender equity in general instead af strictly a cause-and-effect type relationship

Some possible explanations why PTGIAW (grants-in-ad), PTFUNDW (fund-raising), and PTRECRUITW (recruiting), the three resource allocation variables thought to have direct relationships with the degree of gender proportionality achieved by NCAA member institutions, were not found to be individually significant should also be mentioned The fact thet almost one third (33 2 percent) of the institutions participating in this study were Division III institutions which could ant offer athletic scholarships most likely had a large impact on the insignificant finding for PTGIAW Further, even though Divisions I and II could offer athletic scholarships, the minimum percentage

appropriations of zero (refer to Table 11) indicated that at least one institution in each divisional level did not grant any scholarships, a fact that would have further weakened any relationship betweeo these variables.

Lastly, with the exception of capital expenditures for womeo's sports, PTFUNDW and PTRECRUITW received the smallest percentage appropriations of all seven of the women s resource allocation variables (refer to Table 9) This most likely demonstrates the lack of emphasis athletic programs placed on these activities and could have played a part in explaining why these resource allocation variables were not found to have significant impacts on gender proportionality

Discussion of the Second Mathematical Model

The multiple regression analysis of the second mathematical model resulted in a p-value of 0 4398 The null hypothesis failed to be rejected, and it was concluded that this group of resource allocation variables was not significantly related to gender proportionality in this particular study This second mathematical model did not provide a representation of the relationships between resource allocation patterns and gender proportionality at NCAA member institutions based upoo the data reported in the 1992-93 NCAA Financial Survey This result was not predicted since it was hypothesized that these seven resource allocation variables would have an affect on the degree of gender proportionality observed at an institution

Although this second model was not concluded to be significant and no interpretations can be made based upon these results, it is important to note that only 34 of the 473 institutional data sets could be used in this analysis since only 34 institutions

were found to have valid data on all seven variables. This resulted in an observation to variable ratio that was less than the minimum acceptable 5-to-1 ratio (refer to Chapter 4). Further, these 34 institutions were most likely not representative of all NCAA member institutions since this analysis was performed on only 7.2 percent of the data set which itself was only approximately half of all NCAA member institutions.

Due to the manner in which the second set of resource allocation variables (the "percent of category" or "PC" resource allocation variables) were calculated, a large number of zeros resulted, and it is doubtful that any such combination of these variables would have resulted in a representation of the relationships between resource allocation patterns and gender proportionality in intercollegiate athletics under the current reporting system. The NCAA financial survey instructed institutions to round all revenues and expenses to the nearest one-thousand dollars. From the number of valid data points on each "PC" resource allocation variable (refer to Table 18), it was apparent that the two variables with the smallest number of valid data points were PCCAPW and PCFUNDW.

Capital expenditures for women's sports received an average of only 0.09 percent of athletic programs' total budgets while fund-raising for women's sports received an average of only 0.12 percent of the total budgets (refer to Table 9), the two lowest mean percentage appropriations of all the resource allocation variables. The NCAA statistics for 1992-93 survey year reported the average total athletic budget to be about $6.8 million for Division I institutions, about $1.2 million for Division II institutions, and about $550 thousand for Division III institutions (Fulks, 1994). This would have meant that the average appropriation to CAPW, capital expenditures for women's sports, was

approximately $6,100 at Division I institutions, $1,100 at Division II institutions, and $500 at Division III institutions, while the average appropriation to FUNDW, fund-raising for women's sports, was approximately $8,200 at Division I institutions, $1,400 at Division II institutions, and $700 at Division III institutions

If the average appropriations for women's capital expenditures and fund-raising at Division II institutions were $1,100 and $1,400, respectively, and they were $500 and $700, respectively, at Division III institutions, many institutions most likely would have fallen below $500 on both allocations Further, if the men's sports and the administrative appropriations were also below $500, each resource allocation subcategory would have rounded down to zero, making the denominator for the calculation of PCCAPW and PCFUNDW zero Therefore, these appropriations would have resulted in illegal calculations and lost data points. This appeared to be the case in a large percentage of the institutional data sets since only 85 data points were valid for the resource allocation variable PCCAPW, and only 170 data points were valid for PCFUNDW

The only other resource allocation variable with less than 400 data points was PCGIAW with 304 observations However, Division III institutions could not grant athletic scholarships, and 157 of the 473 institutions comprising the sample were Division III institutions Therefore, it would appear that only 12 data points were eliminated due to their invalidity, thus, the reporting method did not appear to pose a problem in the case of PCGIAW All other variables had at least 400 observations, however, the number of zeros that appeared in the descriptive statistics indicated that

even the remaining variables were most likely negatively impacted by the inaccuracy of reporting.

Discussion of the ANOVA Tests on the Categories of Gender Proportionality

In the analyses on the three categories of gender proportionality currently found at NCAA member institutions, no resource allocation variables expressed as percentages of institutions' total athletic budgets and two resource allocation variables expressed as percentages of institutions' respective resource allocation category budgets were significantly related to the category of gender proportionality present at NCAA member institutions. Through conducting these two sets of analyses, PCGIAW and PCEQUIPW, the percent of institutions' total grants-in-aid and equipment budgets appropriated to women's sports, were the only resource allocation variables identified as having significant mean differences between at least two categories of gender proportionality present at NCAA member institutions.

In the ANOVA analyses on the first set of resource allocation variables (the "percent of total" or "PT" resource allocation variables), PTTRAVLW, the percentage of institutions' total budgets allocated for the travel of women's sports teams, was identified as significantly different between at least two of the gender proportionality categories. However, the Bonferrom follow-up test did not find the mean difference large enough to be significant. Therefore, it was concluded that the institutions comprising each of the three gender proportionality categories appropriated a similar mean percentage of their total athletic budgets to women's sports in each of the seven resource allocation categories.

The results of this set of analyses were unexpected since it was hypothesized that significant differences would be found between the categories of gender proportionality that would help explain why institutions' varsity athlete percentages were substantially proportional, borderline proportional or non-proportional to their undergraduate student compositions. Instead, the lack of significant differences in these analyses appeared to indicate that differences in the percent of institutions' total athletic budgets allocated toward expenditures for women's sports were not the reason for the differences in gender proportionality found at NCAA member institutions.

The analyses on the second set of resource allocation variables and the three categories of gender proportionality identified two significant relationships. PCGIAW and PCEQUIPW, the percentage of institutions' total budgets to the grants-in-aid and equipment resource allocation categories appropriated to women's sports, were both identified as having significant mean differences between at least two categories of gender proportionality present at NCAA member institutions. The first significant difference was found on the resource allocation variable PCGIAW between the percent of the grants-in-aid budget allocated to women at the non-proportionate and the borderline proportionate groups of institutions.

The non-proportionate institutions appropriated an average of 31.25 percent of their category budgets to grants-in-aid for women while the borderline proportionate group of institutions appropriated an average of 37.07 percent of their category budgets to women (refer to Table 10). The substantially proportionate group of institutions had a mean appropriation of 36.06 percent of their category budgets that went toward grants-in-

aid for women, a percentage that was not significantly different from that of either of the other two groups of institutions

The significant difference between the grants-in-aid resource allocation variable at the non-proportionate and borderline proportionate groups of institutions raises a number of considerations Institutions that appropriated a larger portion of their grants-in-aid budget to women appeared to have athlete compositions that more closely resembled the undergraduate student compositions at those institutions when comparing non-proportionate institutions to borderline proportionate institutions. However, the borderline proportionate and substantially proportionate groups of institutions were not significantly different on the grants-in-aid resource allocation variable.

Based upon these results, increasing the percentage of the grants-in-aid budget appropriated to women could be a factor in assisting an institution move from the non-proportionate to the borderline proportionate classification at institutions that offer athletic scholarships However, following this line of reasoning, it does not appear that increasing the percentage of the grants-in-aid budget allocated to women will improve the gender proportionality status of an institution from borderline proportionality to substantial proportionality since the substantially proportionate group of institutions had a slightly lower average percentage appropriation to this variable than did the borderline proportionate group

Although a relationship between the percent of grants-in-aid budget appropriated toward female athletes and two categories of gender proportionality observed at NCAA member institutions was found to exist, caution should again be used in assuming that

greater appropriations to this resource allocation variable will result in an improved degree of gender proportionality. There exists the possibility that institutions that appropriated a higher percentage of their grants-in-aid budgets to female athletes had commitments to gender proportionality in their athletic programs. This observed relationship between PCGIAW and CATPROP may be more indicative of the overall attitudes and values of institutions toward gender equity in general instead of strictly a cause-and-effect type relationship.

It should be noted that the value of expressing the resource allocation variables in terms of two different frames of reference was established in this analysis. All three groups of institutions were determined to appropriate similar mean percentages of their total budgets to grants-in-aid for women when the first set of analyses were performed. However, it was determined that the borderline proportional group of institutions on average appropriated a significantly higher percentage of their grants-in-aid category budgets to women than did the non-proportional group of institutions. The significant finding for grants-in-aid when expressed as a "percent of category" variable but not when expressed as a "percent of total" variable can most likely be explained by considering the Division III institutions.

Division III institutions were included in the "percent of total" analyses but not in the "percent of category" of analyses. Recall that zeros were averaged into the calculation of the variable PTGIAW for all Division III institutions since Division III institutions could not grant athletic scholarships, while data points were eliminated from the calculation of PCGIAW for all Division III institutions due to the illegal divisions by

zero that resulted Therefore, the inclusion of Division III institutions in the analysis of PTGIAW could potentially have obscured any real relationship that was present on this resource allocation variable for institutions that grant athletic scholarships (and was one of the reasons why analyses using two different frames of reference were utilized)

The second significant difference was identified on the resource allocation variable PCEQUIPW between the percent of the equipment budget allocated to women at the non-proportionate and the substantially proportionate groups of institutions The non-proportionate institutions appropriated an average of 25 23 percent of their category budgets to equipment for women while the substantially proportionate group of institutions appropriated an average of 34 57 percent of their category budgets to women (refer to Table 10) The borderline proportionate group of institutions had a mean appropriation of 28 27 percent of their category budgets that went toward equipment for women, a percentage that was in between and not significantly different from that of either of the other two groups of institutions.

The most likely explanation for this observed difference focuses on the numbers of male and female athletes at each institution Institutions in the substantially proportionate category probably had a higher percentage of female athletes at their institutions than did institutions that were not substantially proportionate. This would not necessarily have been the case at institutions that were heavily weighted toward one sex in their undergraduate student compositions or at institutions where males were under represented, however, these institutions comprise a small percentage of all NCAA institutions If the percentage of female athletes were higher, it seems likely that the

percentage of the equipment budget allocated for women's sports should have also been higher since a larger number of female athletes would have needed to have been accommodated If this line of reasoning is used, it appears logical that the percentage of the equipment budget allocated to women would have been significantly higher at substantially proportionate institutions than at non-proportionate institutions

Since the percentage of the equipment budget appropriated to women would appear to be directly dependent upon the percentage of females in the varsity athlete composition, there exists a good possibility that institutions that appropriated a higher percentage of their equipment budgets to women's sports had commitments to gender proportionality in their athletic programs As such, this observed relationship between PCEQUIPW and CATPROP may be more indicative of the overall attitudes and values of institutions toward gender equity in general instead of strictly a cause-and-effect type relationship

It should be noted that a similar line of reasoning could be used to explain differences reported for the variables PCTRAVLW and PCSALW between categories of gender proportionality as was used to explain differences between PCEQUIPW and the categories of proportionality The higher the percentage of all varsity athletes at an institution that were female, the higher the percentage of the travel and salary budgets that would have been needed to be spent on women's sports Once again, a larger number of female athletes would have to have been accommodated, and this increased proportion would most likely have had ramifications on the travel and salary budgets for women's sports There was a tendency for the women's percentage allocations of these

category budgets to increase as one moved from the non-proportionate to the substantially proportionate categories on these variables, however, the differences were not large enough to be found significant by the ANOVA analyses and no conclusions can be drawn regarding these relationships

Before concluding these analyses between resource allocation patterns and the categories of gender proportionality, two points should be mentioned First, special attention should once again be drawn to the fact that PCCAPW and PCFUNDW were analyzed with less than half of the number of data points that most of the other variables contained in their respective analyses Although analyses on these variables were still well above the recommended minimum 5-to-1 observation to variable ratio, there remains the possibility that these results were less accurate than the others in this set of analyses due to the large number of missing observations and may be less representative of all NCAA member institutions

Secondly, a peculiarity in the data can be found in the non-proportionate group of institutions on all seven resource allocation variables In the non-proportionate group, the maximums for all resource allocation variables expressed as percentages of institutions' category budgets were 100 In other words, at at least one institution, the women got all of the money spent in a resource allocation category, and this maximum was observed for each resource allocation category This result was unexpected since the institutions forming the non-proportionate group reported females as the under represented sex in 317 of the 318 cases.

Since females were under represented at these non-proportionate institutions, one possible explanation for this occurrence was that women's sports was appropriated 100 percent of the category budget in an attempt to "catch up" to the males. This could have possibly been justified with such resource allocation categories as equipment and capital expenditures where administrators may have decided that the women's teams were more in need of equipment or facilities than the men's teams in that particular fiscal year. Thus, the athletic administrators may have decided to appropriate the entire resource allocation category budget to women.

However, this explanation does not appear to be relevant in terms of other resource allocation categories such as salaries, travel, or grants-in-aid. It is difficult to see how an NCAA member institution supporting a viable athletic program could have not appropriated any money toward salaries for men's coaches and staff, toward travel for men's teams, or toward grants-in-aid for male athletes, especially if 317 of the 318 institutions comprising this group were labeled non-proportionate because of their low female varsity athlete percentages. In these instances, it would appear that the reported maximums most likely represented errors in reporting.

Discussion of the ANOVA Tests on the NCAA Divisional Levels

In the analyses by NCAA divisional level, five resource allocation variables expressed as percentages of institutions' total athletic budgets and all seven resource allocation variables expressed as percentages of institutions respective resource allocation category budgets were found to be significantly related to the divisional level of NCAA member institutions. In the first set of analyses, PTGIAW, PTRECRUITW,

PTEQUIPW, PTTRAVLW, and PTSALW, the percentages of institutions' total athletic budgets appropriated toward grants-in-aid, recruiting equipment, travel, and salaries for women's sports, were all identified as significantly different between at least two divisional levels.

For the resource allocation variable PTGIAW, a significant difference was found between group means in all three pairwise comparisons A significantly different mean percentage of the total budget was allocated toward grants-in-aid for women at all three NCAA divisional levels. Division II institutions allotted the highest average percentage of their total budgets (10 86 percent) to grants-in-aid for women, a mean allotment that was significantly higher than the mean allotment for women's grants-in-aid at Division I institutions (8 14 percent of the total budget) Division III institutions did not grant athletic scholarships, therefore, the mean percentage of their total athletic budget allotted to grants-in-aid for women was zero which was significantly less than the means of Divisions I and II (refer to Table 11)

The results of this analysis were as expected First, the average PTGIAW was expected to have been significantly higher at Division I and Division II institutions than at Division III institutions since Division I and Division II institutions grant athletic scholarships while Division III institutions did not grant athletic scholarships Further, the average PTGIAW at Division II institutions was expected to be higher than at Division I institutions due to the similar average costs of athletic scholarships at both divisional levels. Athletic scholarships represent a huge cost incurred by an athletic program, and since Division II institutions on average had much lower total athletic

budgets than did Division I institutions, this cost most likely represented a significantly larger portion of the total athletic budget at Division II institutions than it did at Division I institutions.

For the resource allocation variable PTRECRUITW, a significant mean difference occurred between the percentages of the total budget allotted toward recruiting/scouting for women's teams at Division II and Division III institutions. Division III institutions allotted the highest average percentage of their total budgets to recruiting/scouting for women's teams (0.73 percent) while Division II institutions allotted the lowest average percentage of their total budgets to this resource allocation category (0.45 percent of the total budget). Division I institutions allotted an average of 0.57 percent of their total budgets to this resource allocation category, a percentage that was not significantly different from that of either Division II or Division III institutions (refer to Table 11).

This result can most likely be explained by considering the amount of money spent on recruiting at each divisional level and the average total athletic budget of each divisional level. First, based upon level of competition, it appears logical that Division I institutions would have spent the greatest amount of money on recruiting, Division III institutions would have spent the least amount of money on recruiting, and that Division II institutions would have fallen somewhere in the middle. This was assumed to be the case because the higher the level of competition and the better the quality of athletes sought, the more money that most likely would have been budgeted for recruiting.

However, as mentioned previously, the average total athletic budget was also much larger at higher levels of competition. The results appear to indicate that the

recruiting budget for Division I institutions was still larger than the budget for Division II institutions even after standardizing these budgets in terms of the average total athletic budget of each divisional level. Further, it would appear that the smaller average recruiting budget of Division III institutions represented a larger percentage of the average total athletic budget of Division III institutions after standardization, most likely due to an average total athletic budget that was a fraction of that of the other divisional levels. This would explain the greatest percentage difference occurring between Division II and III institutions, the only difference large enough to be significant.

Lastly, the resource allocation variables PTEQUIPW, PTTRAVLW, and PTSALW were significantly different between Divisions I and III and between Divisions II and III (refer to Table 24). These significant differences occurred because Division I and II institutions were fairly similar in the average percentages of their total budgets they allocated toward equipment and travel for women's teams and salaries for woman's coaches and staff (0.88 percent versus 1.48 percent for PTEQUIPW, 2.52 percent versus 3.35 percent for PTTRAVLW, and 5.32 percent versus 6.93 percent for PTSALW), however, Division III institutions on the average allocated a much greater percentage of their total athletic budgets to these resource allocation categories (4.17 percent for PTEQUIPW, 6.00 percent for PTTRAVLW, and 13.34 percent for PTSALW). Therefore, the pairwise comparisons between Divisions I and III and between Divisions II and III were significant on all three resource allocation variables, while the comparisons between Divisions I and II were not significant.

Salaries, travel, and equipment were presumed to represent the three largest expenditures in Division III athletic programs, an assumption that appears logical since the average expenditures in these categories for men's teams should have been greater than or equal to those for women's teams since men on the average are over represented in intercollegiate athletics. However, these categories were overshadowed by the expenditures for grants-in-aid at Division I and Division II institutions. In other words, these three resource allocation categories were a distant second, third, and fourth, respectively, at Division I and II institutions. If approximately 20 or 30 percent of institutions' total athletic budgets were allocated toward athletic scholarships at Division I and II institutions while zero percent of institutions' total athletic budgets were allocated toward athletic scholarships at Division III institutions, it appears logical that PTSALW, PTTRAVLW, and PTEQUIPW represented a significantly larger percentage of the total budget at Division III institutions than these resource allocation categories represented at Division I or Division II institutions.

The analyses on the second set of "percent of category" resource allocation variables and the three NCAA divisional levels identified significant differences between at least two divisional levels on all seven resource allocation variables. On the resource allocation variable PCGIAW, Division I and II institutions were similar in the percentages of their category budgets they devoted to women (31.75 percent versus 35.25 percent), a percentage difference not large enough to be significant by the Bonferroni post hoc test. However, the lack of athletic scholarships in Division III translated to zero

percent of the category budget devoted to grants-in-aid for female athletes, a percentage that was significantly less than the allocated percentages at Division I and II institutions

These results indicate that there should have been only minor differences in gender proportionality at Division I and Division II institutions based upon the relative percentages of grants-in-aid appropriated for female athletes assuming that undergraduate student compositions were relatively similar Further, Division III institutions should have had comparable or better gender proportionality percentages based upon this variable since this resource allocation category was not a factor in male or female participation rates in Division III This was proved to be the case since a subsequent analysis performed to determine the average gender proportionality value at each divisional level indicated mean percentage differences of 21 percent and 18 percent at Division II and Division I institutions, respectively, while the mean percentage difference at Division III institutions was reported to be 13 5 percent Average percentage differences at Division I and Division II fell within the non-proportional gender proportionality grouping while the average difference at Division III institutions fell within the borderline proportionate grouping

On the resource allocation variable PCFUNDW, Division I and III institutions were significantly different in the percentages of their fund-raising category budgets allocated to women's sports Division I institutions on average allocated the lowest percentage of their category budgets to their women's programs (5 85 percent), while Division III institutions allocated the highest percentage (26 79 percent of the category budget) Division II institutions were in the middle (15 29 percent allocated to women's

sports) reporting a mean that was not significantly different from that of Division I nor Division III.

It is apparent from this analysis that the lower the level of competition, the more emphasis that was most likely placed on women's sports out of the fund-raising category budget. Some possible explanations for this observed result are as follows. 1) The majority of the fund raising budget was allocated toward revenue-producing sports such as football and basketball at Division I institutions. Since football and basketball programs at Division III institutions do not generate a fraction of the revenue that they do at Division I institutions, these institutions may have been more likely to distribute fund-raising monies more evenly between all sports, both men's and women's. Further, a significant portion of the Division III institutions participating in this study did not sponsor football while almost all Division I institutions sponsored football at some level of competition. Therefore, with football out of the equation for many Division III institutions, athletic administrators may have viewed the remaining sports, both men's and women's, as equally capable of raising money with funds appropriated for that purpose. 2) Division I programs may have been more likely to generate general booster support for their athletic programs as a whole than less competitive divisions. Division I institutions may have allocated a larger portion of their fund-raising budgets to administrative fund-raising where funds were sought to support the entire athletic program rather than a particular sport. 3) Division III institutions may have been forced to be more advanced in their women's fund-raising efforts in order to support their women's programs under current budgetary constraints. If this scenario were concluded,

Division I institutions would do well to follow this pattern and to attempt improved gender proportionality by improving their fund raising efforts for women's sports

On the resource allocation variables PCRECRUITW and PCCAPW, the percentage of institutions' recruiting and capital expenditures budgets appropriated to women's sports, Divisions II and III were similar in their percentage allocations to women while Division I was significantly lower. For this reason the percentage difference was not found to be significant between Divisions II and III (28 84 percent versus 33 52 percent for PCRECRUITW, and 22 66 percent versus 26 78 percent for PCCAPW). However, the percentage difference of both Divisions II and III with Division I (22 58 percent for PCRECRUITW and 5 50 percent for PCCAPW) was found to be significant.

The results of these analyses uncovered some interesting relationships. First, it was predicted that the percentages of the recruiting budget allocated to women would be similar at Division I and II institutions while it would be higher at Division III institutions. Again, this was predicted because Divisions I and II offered athletic scholarships while Division III institutions did not, and because Division III had a large percentage of institutions that did not sponsor football, a sport that normally inflates the men's percentages. Instead, the percentages were not significantly different between Division II and III institutions, but both percentages were significantly different from that of Division I institutions. Possible explanations for these results are as follows: 1) Division II also contained a large percentage of institutions that did not sponsor football which may have made this division more like Division III in terms of recruiting. 2) At

higher levels of competition, more emphasis may have been placed on recruiting athletes for revenue-producing sports such as men's football and basketball than on recruiting athletes for non-revenue producing sports. This would have tended to increase the percentage of the recruiting budget appropriated to men's programs. 3) Division II and III institutions may have been more gender proportional which most likely would have resulted in more equivalent men's and woman's recruiting budgets.

The analysis on the capital expenditures resource allocation variable also resulted in some interesting relationships. While Division II and III institutions spent approximately 23 and 27 percent of their capital expenditures budgets on women's sports, respectively, Division I institutions only spent 5.5 percent of their category budgets on women's capital expenditures. Some possible explanations for this observed result are as follows: 1) Division I institutions may be far ahead of Division II and III institutions in their facilities for women's sports, therefore making a larger appropriation to this category unnecessary. 2) Division I institutions on average appropriated most of their capital expenditure budgets to revenue-producing sports at the expense of other sports, particularly women's. 3) The majority of the capital expenditures budget went toward administrative purposes at Division I institutions. Further research on the reasons behind these differences in capital expenditures between divisions are required if any relationship to gender proportionality is to be identified.

Lastly, the analyses on the final three resource allocation variables in the second set of analyses, PCEQUIFW, PCTRAVLW, and PCSALW, the percentage of institutions' equipment, travel, and salary budgets appropriated for women's sports,

indicated that all three pairwise comparisons were significant. In other words, all mean percentage allocations for PCEQUIPW (20 86 for Division I, 26 01 for Division II, and 34 99 for Division III), for PCTRAVLW (29 84 for Division I, 36 16 for Division II, and 41 72 for Division III), and for PCSALW (15 62 for Division I, 21 91 for Division II, and 28 70 for Division III) were large enough to be found significant by the Bonferroni tests Further, these were the same three resource allocation categories found to have two significant differences in the first set of analyses, indicating their prominence in explaining important differences between institutions in the three major NCAA divisional levels

These three analyses indicate that women's sports got a larger percentage of the equipment budget, the travel budget, and the salary budgets as the competitive level decreased from Division I to Division III This would appear to be a very significant finding since it could mean a number of things, the most important being a direct relationship between the level of competition and the degree of gender proportionality achieved by NCAA member institutions In other words, the lower the level of competition, the more likely institutions may have been to support gender proportional athletic programs There is always the chance, however slight, that the mean percentage of female varsity athletes at Division III institutions was low but these institutions were still within the definition of substantial proportionality However, the fact that these three resource allocation categories are ones that should have a strong link to the percentage of females in the varsity athlete composition (i e , the higher the percentage of varsity athletes who are female, the higher the percentage of the equipment budget that should be

appropriated toward women's sports, etc) appears to point toward a higher female athlete percentage at lower levels of competition

Another possibility could be that the equipment, salary, and travel budgets for high revenue producing sports are often a large percentage of these category budgets in the more competitive divisions This is often due to the large cost of running these programs Therefore the percentages of the category budgets may appear to be more in favor of men's sports, thus, the percentage of these budgets appropriated to women may not have as strong a relationship with gender proportionality at the higher levels of competition as they would at the lower divisional levels

Discussion of the ANOVA Tests on the Football Status of NCAA Member Institutions

In the analyses by football status of NCAA member institutions, five resource allocation variables expressed as percentages of institutions' total athletic budgets and all seven resource allocation variables expressed as percentages of institutions' respective resource allocation category budgets were found to be significantly different between football sponsoring and non-sponsoring institutions In the first set of analyses, PTFUNDW, PTRECRUITW, PTEQUIPW, PTTRAVLW, and PTSALW, the mean percentage of institutions' total athletic budgets appropriated toward fund-raising recruiting, equipment, travel, and salaries for women's sports, were all identified as significantly different between football statuses at NCAA member institutions

The mean percent allocations for PTFUNDW (0 08 percent for football institutions versus 0.23 percent for non-football institutions), for PTRECRUITW (0.54 percent versus 0 73 percent), for PTEQUIPW (1 44 percent versus 4 40 percent), for

PTTRAVLW (3.02 percent versus 6 32 percent), and for PTSALW (6 65 percent versus 14 11 percent) were all significantly different These results indicated that a larger percentage of institutions' total athletic budgets were appropriated to women's sports in five of the selected seven resource allocation categories at institutions that did not sponsor football.

This appears logical for a number of reasons 1) Football is unique in its large roster sizes These large roster sizes tend to significantly contribute to the over representation of male athletes in an athletic program. Therefore, it is a valid assumption that females represented a smaller proportion of the varsity athletes at institutions that sponsored football 2) Football is a very costly sport. Once again, sponsoring football most likely meant that an athletic program would have had to appropriate a larger percentage of institution's total athletic budget to the men's program

Although five variables were significantly different between football statuses, football appears to have had the largest impact on the equipment, travel, and salary budgets. Division I football programs have as many as ten full-time coaches and two graduate assistant coaches as well as several staff members Just on number of employees alone, it is apparent that the salary resource allocation category would have been impacted by football, not to mention the large salaries that are often paid to coaches of this prominent sport. The equipment and travel budgets are also significantly impacted by football Football would have had a huge impact on the equipment budget through all of the helmets, pads, shoes, uniforms, weights, blocking devices, etc that were required to outfit and train teams Football would have impacted the travel budget through the

large number of student-athletes, coaches, and staff that would have had to have been transported and housed for every away game

Just as the equipment, salary, and travel budgets for high revenue producing sports were hypothesized to have been a large percentage of these budgets at the more competitive divisional levels, football would also be expected to have a significant impact on these three budgets This is often due to the high cost of running these football programs Therefore, institutions' percentages of the total budget appropriated in these areas may appear to be more in favor of men's sports, thus, the percentage of institutions' total budgets appropriated to women in these areas may not have as strong a relationship with gender proportionality at institutions that sponsor football as they would at the non-football sponsoring institutions

Of special interest is the fact that the percentage of the total budget appropriated toward grants-in-aid for female athletes and toward capital expenditures for women's sports were not significantly different between football sponsoring and non-sponsoring institutions. This is an interesting result since it would appear that institutions on the average do little to correct for the large imbalance in these areas brought about by football at their institutions

Finally, it should be noted that some common trends were apparent in these analyses Four of these five resource allocation variables found to be significantly different by football status were the same variables found to have significant differences by divisional level Only the first variable was different with PTFUNDW identified as significant in these analyses as opposed to PTGIAW identified as significant in the

analyses by divisional level Therefore, this trend gives more strength to the argument that the equipment, travel, and salary resource allocation variables are probably the most useful variables of the seven in the explanation of differences between different groupings of institutions

In the second set of analyses, all seven resource allocation variables were identified as significantly different between football sponsoring and non-sponsoring institutions. The mean percent allocations for PCGIAW (28 13 percent for football institutions versus 44 85 percent for non-football institutions), for PCFUNDW (7 50 percent versus 24 43 percent), for PCRECRUITW (22 68 percent versus 42 65 percent), for PCEQUIPW (20 55 percent versus 44 12 percent), for PCTRAVLW (30 46 percent versus 49 16 percent), for PCSALW (17.50 percent versus 33 09 percent), and for PCCAPW (10 04 percent versus 31 43 percent) were significantly different between institutions in the two football statuses.

The women's percentages of the majority of the category budgets were twice as large at institutions that did not sponsor football than at institutions that offered football as one their varsity sports. These analyses again support how much more difficult it was for institutions that sponsored football to achieve gender proportionality since the women's percentages of the total budget on most resource allocation variables as well as the women's percentage of all category budgets were significantly smaller at institutions that sponsored football

One more peculiar result was observed in this second set of analyses on the football sponsoring group For the first three resource allocation variables (PCGIAW,

PCFUNDW, and PCRECRUITW), at least one institution sponsoring football reported that women's sports received 100 percent of these category budgets. It would not be expected that an institution sponsoring football would grant 100 percent of its athletic scholarship budget, fund-raising budget, or recruiting budget to women. Therefore, there exists the possibility that some degree of inaccuracy occurred in the reporting of data.

Conclusions

Although discussions of the results of each mathematical model and each set of analyses on the three categorical variables have been presented, a summary of how this study can assist NCAA member institutions implement equitable athletics programs through the expansion of the body of knowledge in this area has yet to be discussed. The following summary groups the results of all analyses into five major categories of findings thought to be the most significant insights identified in this study.

The Models

The first mathematical model served its purpose in providing a representation of the relationships between resource allocation patterns and gender proportionality at NCAA member institutions. Athletics administrators can substitute their athletic programs' values for the variables in the model and calculate a potential resultant value for gender proportionality. Again, this model will not be accurate for all NCAA member institutions due to the model's inherent biases and due to characteristics that are specific to individual institutions making them impossible to model into a general equation. However, if the mathematical model fits the financial and gender proportionality data of an institution within an acceptable range of error, this mathematical model could

potentially provide athletics administrators with a pragmatic tool when making funding decisions. Athletics administrators at institutions that would not presently be found substantially proportionate can work with this equation during the budgeting process to establish a resource allocation pattern that could effectively meet the needs of their programs while at the same time move the athletic program in the direction of gender proportionality.

Administrators may find that by using this equation they are able to identify inefficiencies in their budgets, or resources that could be better appropriated to increase the level of gender proportionality present at their institutions while still maintaining current levels of competitiveness. This is not an easy process, but institutions of higher education in general have managed a transformation from budgets ridden with inefficiencies to ones that are more streamlined, and athletic programs must do the same.

Although the model could potentially prove useful to athletics administrators who are seeking gender proportional athletics programs, caution should be used in employing this mathematical model. The model can provide some basic facts and insights; however, administrators must understand that it is doubtful that gender proportionality can be achieved simply through manipulating an equation. There exists the possibility that institutions currently classified as substantially proportional achieved that classification in large part due to their administrators' overall values and attitudes toward gender proportionality at their respective institutions. As such, this classification may be more indicative of the institutions' outlook and goals regarding gender equity in general instead of strictly a cause-and-effect type relationship. It is not as simple as an increase in the

percent of the budget allocated toward categories of expenditures for women's sports equals an improvement in the gender proportionality observed at that institution—reappropriation must be coupled attitudinal variables that underlie a desire to sponsor equitable programs

Since no published literature has attempted to identify relationships between resource allocation patterns and gender proportionality, the model should provide a basis for the establishment of such literature and a foundation for further research This model should also add to the knowledge in the field by providing a pragmatic tool that could potentially assist in the streamlining of budgets and the guiding of institutions in their efforts toward gender- proportional athletic programs.

The second mathematical model did not serve its purpose in providing a representation of the relationships between resource allocation patterns and gender proportionality at NCAA member institutions However, the analysis of this model expanded the knowledge in the field by showing the limitations of current reporting methods and providing a perspective for changes that would refine current reporting methods Since no published literature has attempted to identify relationships between resource allocation patterns and gender proportionality, the model should provide a basis for the establishment of such literature and a foundation for further research

Equipment, Travel, and Salary

Equipment, travel, and salary continually surface as the resource allocation variables most strongly related to gender proportionality in intercollegiate athletics. However, these were not the resource allocation variables initially predicted to have the

strongest relationships with gender proportionality (refer to Chapter 3). Instead, grants-in-aid for female athletes, fund-raising for women's sports, and recruiting for women's sports were the three resource allocation variables predicted to directly impact gender proportionality in intercollegiate athletics by increasing female participation rates, while equipment, travel, and salary were believed to have only indirect effects on gender proportionality. These effects were predicted to be indirect since expanding these areas were thought to give athletic programs the flexibility and potential to increase women's participation rates, however, these areas were not predicted to be ones that would be a direct cause of women entering the program.

After all analyses were conducted, the equipment, travel, and salary resource allocation variables were the ones that appeared to have the direct relationships with gender proportionality, and these direct relationships appeared to be for a reason other than that predicted. equipment, travel, and salary appeared to be directly dependent on the percentage of female varsity athletes at an institution. In both sets of analyses by category of gender proportionality, by divisional level, and by football status, findings for these three variables almost always pointed toward a direct relationship with the percentage of varsity athletes that were female.

This appears logical since the equipment budget and the travel budget appropriated to women's sports as well as the salary budget for coaches and staff of women's sports (from both percentage frames of reference) should have been proportionate to the percentage of athletes who were female. For example, relationships of proportionality were most likely demonstrated through the following results: 1) salary

was identified as having a significant relationship with gender proportionality in the regression analysis holding all other variables constant, 2) equipment was identified as being significantly different between the non-proportionate and the substantially proportionate groups of institutions in the first set of ANOVA analyses, and 3) equipment, travel, and salary were the most useful variables in the explanation of the differences between institutional groupings by divisional level and football status (the second and third sets of ANOVA analyses), which often could be linked to differences in proportionality. The other four resource allocation variables did not exhibit these suggested direct relationships with the percentage of female varsity athletes.

Although no cause-and-effect relationships have been established conclusively (i.e., expanding these three budgets will not necessarily increase the percentage of female athletes in an athletic program), the results would suggest that these variables do appear to represent the main budgetary categories that possibly need to be increased if a more balanced program is to be achieved. It should be noted that the direction of the relationship appears opposite from others in this study, in other words, the equipment, travel, and salary budgets for women's sports most likely increased due to increases in the female varsity athlete percentages at the respective institutions, not the other way around. Therefore, as the percentage of females participating in an athletic program increased, necessary increases in the equipment, travel, and salary budgets most likely resulted.

Since these three resource allocation categories (equipment, travel, and salary) most likely expand in response to an increased percentage of female athletes, it is quite

likely that prior changes occurred in programs that are currently proportional to make these reallocations possible Once again, there exists the possibility that institutions currently classified as substantially proportional achieved that classification in large part due to their administrators' overall values and attitudes toward gender proportionality at their respective institutions A desire to achieve gender proportionality by sponsoring equitable programs most likely would have led to percentage expansions of female athletes, making resultant expansions in these three budgets necessary In other words, proportionality most likely determined the resource allocation categories that had the direct relationships in this study, and not the reverse Further, reappropriation was likely coupled with attitudinal variables that were part of a desire to sponsor equitable programs

In summary, if institutions are to become substantially proportional by increasing opportunities for women instead of taking away opportunities from men, these would appear to be the three resource allocation categories that will have to be increased to accommodate the larger percentages of female varsity athletes Again administrators must look for ways to streamline budgets and become more efficient so that these three resource allocation areas can be expanded. There are no other studies that have attempted to formulate the relationships between resource allocation patterns and gender proportionality, therefore, the identification of the critical importance of the equipment, travel, and salary resource allocation variables constitutes a foundation for future literature and research

Grants-in-Aid

The grants-in-aid resource allocation variables for female athletes did not appear to have as strong a relationship with gender proportionality as expected. There was a significant difference between grants-in-aid at the non-proportionate and borderline proportionate groups of institutions. Institutions that appropriated a larger portion of their grants-in-aid budget to women appeared to have athlete compositions that more closely resembled the undergraduate student compositions at those institutions when comparing non-proportionate institutions to borderline proportionate institutions. However, the borderline proportionate and substantially proportionate groups of institutions were not significantly different on the grants-in-aid resource allocation variable.

Based upon these results, increasing the percentage of the grants-in-aid budget appropriated to women could be a factor in assisting an institution move from the non-proportionate to the borderline proportionate classification at institutions that offer athletic scholarships. However, following this line of reasoning, it does not appear that increasing the percentage of the grants-in-aid budget allocated to women will improve the gender proportionality status of an institution from borderline proportionality to substantial proportionality since the substantially proportionate group of institutions had a slightly lower average percentage appropriation to this variable than did the borderline proportionate group.

Secondly, Division II institutions appropriated a significantly higher percentage of their total budgets to grants-in-aid for women than Division I institutions, however, Division II institutions on average were 21 points away from gender proportionality

(there was a 21 percent difference between the female undergraduate percentage and the female varsity athlete percentage) while Division I institutions averaged 18 points from exact proportionality. Further, Division III institutions averaged 13 5 points from exact proportionality, an average that was within the borderline proportionate category and was approximately 4 5 points closer to proportionality than Division I and 7 5 points closer to proportionality than Division II, both significant differences.

Although grants-in-aid for female athletes appeared to have some degree of relationship to the gender proportionality status of Division I and II institutions, this relationship was not determined to be as strong as the relationship between gender proportionality and some of the previously mentioned resource allocation variables. Further, Division III institutions, which could not offer athletic scholarships, tended to have more proportional athletic programs on the average. Therefore, it was clear from the approximately 20 or 30 percent of the total athletic budget spent on grants-in-aid at Division I and II institutions that these athletic scholarships comprised a large percentage of athletic budgets, and it is very likely that the number of athletic scholarships granted had a direct affect on the quality of these athletic programs. However, these results suggest that increasing the number of athletic scholarships granted may not improve the gender proportionality of an athletic program.

If this line of reasoning is accurate, an institution may be better off spending more money on equipment, travel, and salaries for women's teams, variables believed to have a direct impact on gender proportionality, instead of increasing athletic scholarships for women. While some may argue that the competitive level will decrease, it may not

decrease substantially if other institutions follow this lead, and institutions will most likely be better served in the long run by complying with the law, therefore avoiding any potential problems due to non-compliance. Since athletic scholarships are also tested on their own for compliance with Title IX, any changes made to scholarship limits must be equivalent between sexes.

Even where relationships were concluded between the grants-in-aid resource allocation variable and gender proportionality, caution should again be used in assuming that greater appropriations to this resource allocation variable will result in an improved degree of gender proportionality. There exists the possibility that institutions that appropriated a higher percentage of their grants-in-aid budgets to female athletes had commitments to gender proportionality in their athletic programs. This observed relationship between grants-in-aid and gender proportionality may be more indicative of the overall attitudes and values of institutions toward gender equity in general instead of strictly a cause-and-effect type relationship.

This analysis expands the knowledge base in this area by presenting grants-in-aid as a resource allocation variable that appears to have a complex relationship with the degree of gender proportionality achieved by NCAA member institutions. Once again, this observation may serve as a starting point for literature and research that may identify guidelines for optimizing institutions' appropriations to this resource allocation category.

Capital Expenditures

Based upon the limited number of significant relationships established between the capital expenditures resource allocation variable and the non-financial variables used

in this study, definite links to gender proportionality could not be concluded The only relationships identified as significant were between PCCAPW, the percent of the capital expenditures category budget appropriated to women's sports, and divisional level and between PCCAPW and football status Whereas connections to gender proportionality could often be formulated oo other resource allocation variables due to greater numbers of coocluded significant differences, the results on the capital expenditures variables did not warrant the formulation of such hypotheses

This analysis expands the knowledge base in this area predominantly through demonstrating the lack of relationships that appear to exist betweeo capital expenditures and gender proportionality Once again, this observatioo may serve as a starting point for literature and research that may be able to identify links or the lack thereof between resource allocation patterns and gender proportionality

Fund-Raising and Recruiting

Fund-raising and recruiting were two of the variables believed to have direct impacts on the geoder proportionality present in intercollegiate athletics. However, only a few significant relationships were ideotified on these variables, all either between divisional levels or football statuses, and definite links to gender proportionality could not be concluded from these results Further, with the exception of capital expenditures, fund-raising and recruiting for women's sports received the smallest appropriations of all seven resource allocation variables. It would appear that gender proportionality had little to do with recruitment and fund-raising activities (although they more than likely did have an affect on competitive level) but more with athletic administrators' concerns for

providing sufficient sports including the variables that were found to be directly related to the operation of those sports

These small allocations appear to indicate a lack of emphasis by athletic programs on fund-raising and recruiting activities It is possible that by increasing the emphasis on these areas, more money could be generated for women's programs and more potential female athletes could be attracted to athletic programs. If this were the case in the future, relationships between fund-raising and recruiting and gender proportionality may become apparent. Secondly, the average percentages of institutions' total athletic budgets appropriated to these resource allocation categories was so small that a possible floor effect could have resulted in the current analyses In other words, the variances could have been so small that existing relationships went undetected

These analyses on fund-raising and recruiting did not appear to identify any conclusive relationships that added to the knowledge base in this area, these two variables did not uncover information for the evaluation of institutions' strides toward improving gender equity Although it is still believed that fund-raising and recruiting should help improve the gender proportionality at NCAA member institutions, no such conclusions can be drawn from this study

Suggestions for Further Research

Due to the fact that this study examined an area virtually unexplored in the literature, many questions were raised that could not be answered based upon the results of this study or the findings of previous literature Some questions were based upon the need to know further information, while others were based upon recommended changes

to current reporting methods, however, most of the unanswered questions surrounded the resource allocation variables and explanations for the results that were obtained Therefore, many further studies have been suggested that could potentially explain some of these observed results Suggested studies have been broken down by category

Studies Requiring Additional Information

There is much information that could potentially provide valuable insight into the relationships between resource allocation patterns and gender proportionality that is not currently part of the NCAA financial survey For instance, reporting information on the percentage of budget requests in each resource allocation category that are granted to women's programs could provide valuable insight into the resource allocation/gender proportionality relationships An interesting study could consist of analyzing the differences between the requested amounts and the appropriated amounts to each category (standardized in a manner similar to those used in this study) and determining whether or not these resource allocation differences have a significant relationship with the degree of gender proportionality observed at NCAA member institutions. A study could also be performed in the context of the entire athletic programs to investigate whether or not there are significant differences in the percentage of budget requests received between men's and women's programs at institutions in the different categories of gender proportionality A note of caution should be mentioned--these studies would assume that budget requests are reasonable and fair, not padded to acquire equity

Studies Requiring Reporting Changes

A few minor reporting changes in the current NCAA financial survey could potentially provide further insight into the relationships between resource allocation patterns and gender proportionality. First, many data points had to be eliminated from individual analyses and only 34 institutional data sets could be used in the analysis of the second mathematical model due to the inaccuracy of the current reporting system. The NCAA financial survey instructed institutions to round all expenditures to the nearest one-thousand dollars. Therefore, all expenditures falling below $500 were reported as zeros. Due to the manner in which the "percent of category" resource allocation variables were calculated, a large number of zeros in the denominators for these calculations resulted causing data points to be eliminated.

Greater accuracy in reporting expenditures would have greatly reduced the number of deleted observations that resulted in this study. Data points would most likely not be lost if all appropriations were reported to the nearest hundred dollars instead of to the nearest thousand dollars as currently requested. If the degree of accuracy were increased, an interesting follow-up study would be to determine if the second mathematical model significantly predicts the relationships between resource allocation patterns and gender proportionality when more institutions are included in the analysis.

Secondly, there was also a concern regarding the accuracy of subdivisions within a resource allocation category. All resource allocation categories were subdivided into allocations to women's sports, men's sports, and administration. Because the exact proportion that went toward each of these three subdivisions is often difficult to estimate,

it is quite likely that a certain amount of error entered into the data due to careless reporting. For example, if a new sports facility was built by an institution, proper reporting would consist of determining what percentage of the time women's sports, men's sports, and administration each used the new facility in the surveyed fiscal year. Each subdivision of the capital expenditures resource allocation category would then be credited with that percentage of the cost of the facility for the fiscal year.

However, due to careless reporting and/or unwillingness to invest the time necessary to accurately calculate these numbers, it was thought that many institutions may have simply reported a set fraction, such as 33 percent of the cost to each subdivision, instead of doing this calculation. The tendency for institutions to give women a set percentage of each category budget could have resulted in multiple variables with identical values and could potentially explain the high degree of multicollinearity reported between variables. If the degree of accuracy of reporting between subdivisions were more precisely monitored, an interesting follow-up study would be to determine if the results of this study would be replicated or if different relationships between resource allocation patterns and gender proportionality would be established.

Thirdly, there is currently no way of knowing what institutions reported in their "other" resource allocation categories. Therefore, an idea for a further study could be to ask administrators to list descriptive data on the major expenditures reported in their institutions' "other" categories. If certain expenditures frequently appear in this "other" category and are appropriated a substantial percentage of the total athletic budget, future NCAA financial surveys could be altered to included these new categories. For example,

a considerable expenditure for many institutions over the past few years has been in the area of student services (e g academic counseling, career counseling tutoring and mentoring, etc) If this type of expenditure is frequently reported as a component of institutions' "other" resource allocation category, the NCAA may want to consider adding a new resource allocation category on future surveys

Finally, perhaps the greatest limitation of this study was the voluntary means by which the data were collected As with most studies where data are collected on a voluntary basis, there is a good chance that the data used in this study represented the upper half of the population in terms of financial resources and degree of gender proportionality achieved Institutions with poor financial statuses or extremely unbalanced athletic compositions were probably less likely to complete the survey and return it to the NCAA than institutions with promising current statuses Therefore, in order to eliminate biases assumed to have entered into these results, the NCAA could request the completion of similar questionnaire surveys as part of their requirements for membership in the organization With the collection of these data, further studies could be performed that may more accurately represent the population as a whole rather than only representing institutions that choose to participate

Studies on the Capital Expenditures Resource Allocation Variable

Although no significant relationships were established between capital expenditures and gender proportionality, some interesting trends were observed that would appear to form a basis for further investigation. First, the relationship between capital expenditures and proportionality in the first mathematical model was not

individually significant. However, capital expenditures was the only one of the seven resource allocation variables suggested as having a positive association with the percentage difference used to calculate proportionality in the first model

Again, no conclusions could be drawn from this study since capital expenditures was not individually significant in the prediction of gender proportionality. However, further studies should be performed to investigate whether this unusual observation occurred by chance or had merit. If the capital expenditures resource allocation variable is indeed concluded to be positively related to proportionality in the model, this would have meant that as the percentage of the total budget spent on capital expenditures for women's sports increased, the average gender proportionality reported at NCAA member institutions decreased, or the percentage difference between women in the undergraduate student body and female varsity athletes tended to increase.

Secondly, it was observed that not a single one of the 32 institutions categorized as substantially proportionate spent any money on capital expenditures for women's sports. Combined with the positive value of capital expenditures in the first mathematical model, could this mean that institutions with a low degree of gender proportionality are the ones just beginning to spend money on capital expenditures for women's sports? Conversely, do institutions that are currently classified as substantially proportionate already have adequate facilities for women's sports making capital expenditures unnecessary? Again, this interesting observation warrants further study.

If these results are replicated, this may suggest that capital expenditures is a compensatory variable to an institution's progress toward gender proportionality. In

other words, capital expenditures for women's sports may represent a variable that an institution must spend money on before it will be able to work toward gender proportionality. Although capital expenditures may not directly affect the proportionality of an athletic program, this expenditure may be an important prerequisite to obtaining a proportional program. A further investigation of these trends could potentially provide valuable insight into resource allocation/gender proportionality relationships

Studies on the Equipment, Travel, and Salary Resource Allocation Variables

Equipment, travel, and salary were identified as the three resource allocation variables that had direct impacts on the gender proportionality observed at NCAA member institutions. It would appear that these were the three variables most strongly related to the operation of the women's sports program, therefore, the percentage of these budgets appropriated toward women's sports appeared to become more equitable as the degree of gender proportionality became more equitable.

Due to their strong relationships with gender proportionality, further studies are warranted on these variables. An interesting study would be a more in-depth analysis of how much each of these variables will have to increase on average for every point improvement in the degree of gender proportionality observed at NCAA member institutions. Since these appear to be the three most important variables that must be increased if more female athletes are to be accommodated, knowing this information could help athletic administrators concerned with achieving proportionality more effectively budget for any planned program expansions.

Studies on Grants-in-Aid for Female Athletes

The grants-in-aid resource allocation variables for female athletes did not appear to have as strong a relationship with gender proportionality as expected. Further studies should be performed on this resource allocation variable to investigate whether or not these findings are confirmed. If so, it was hypothesized that institutions may be better off spending more money on equipment, travel, and salaries for women's teams, variables believed to have a direct impact on gender proportionality, instead of increasing athletic scholarships. Another interesting study would be a formulation of guidelines that may help institutions make educated decisions regarding the percentage of their total budgets that are allocated toward scholarships as opposed to other program areas. These studies may increase the merit of proposals such as need-based scholarships or other suggested solutions that reduce the percentage of Division I and II institutions' total budgets going toward grants-in-aid.

Studies on Fund-Raising and Recruiting for Women's Sports

Neither fund-raising nor recruiting for women's sports was significantly related to gender proportionality in this study. However, it was hypothesized that significant relationships may not have been identified due to the small budgets that were characteristic of these categories. For this reason, these resource allocation variables may be better analyzed on a case-study basis. Further studies analyzing individual institutions' strides in these areas and any impact these strides may have on the degree of gender proportionality observed at those institutions could provide useful information that other institutions could follow in their efforts to achieve gender proportionality.

Final Conclusion

These aforementioned analyses were an attempt to identify significant relationships among resource allocation patterns and gender proportionality at NCAA member institutions. Many significant relationships were identified which, combined with an institutional commitment to gender equity, could assist athletics administrators in compliance efforts with this aspect of Title IX.

The critical need for this type of information cannot be refuted. If institutions of higher education are to achieve compliance with this aspect of Title IX while not sacrificing the level of competition currently enjoyed, more studies must be pursued that expand upon the relationships identified in this preliminary study in an attempt to aid administrators in the tough decisions that inevitably lie ahead.

APPENDIX

NCAA FINANCIAL SURVEY

QUESTIONNAIRE FOR ANALYSIS OF REVENUES AND EXPENSES OF INTERCOLLEGIATE ATHLETICS PROGRAMS

The questionnaire for this study which is sponsored by the National Collegiate Athletic Association consists of three parts

Part I – General Information
Part II – Organization and Activity Data
Part III – Revenue and Expense Information

All questions and schedules in this questionnaire refer to the men's and women's intercollegiate athletics programs on a combined basis, unless there are instructions to the contrary

I GENERAL INFORMATION

Please limit your responses to intercollegiate athletics only, excluding intramural or club sports If the question does not apply to your institution indicate so by marking "NA " Be assured that all responses will remain anonymous.

1 Your institution is considered

___ a Public
___ b Private.

2 The current NCAA classification of your institution is

___ a Division I A
___ b Division I-AA
___ c. Division I-AAA
___ d Division II with football
___ e Division II with no football
___ f Division III with football
___ g Division III with no football

3 At your institution does intercollegiate athletics (mark all that apply)

___ a Obtain financial assistance from the general operating funds of the institution in deficit years?

___ b Rely upon general operating funds of the institution to absorb certain expenses such as travel and salaries?

___ c Receive financial support from the institution to subsidize nonrevenue-producing sports?

___ d. Operate on a self supporting basis within the limits provided by revenues from athletics?

4 Please indicate the one statement that best describes the fiscal objectives of intercollegiate athletics at your institution

___ a To earn a profit in order to expand the athletics program

___ b To earn a profit in order to support nonathletics activities sponsored by the institution

___ c To earn sufficient revenues to cover the expenses of the athletics program

___ d To earn as much revenue as possible with any deficit in athletics covered by general operating funds of the institution

___ e None of these. Our institution relies upon general operating funds to support a broad based athletics program

5 The following questions pertain to your institution's assessment of student fees

a Does your institution assess students a specific activity (or athletics) fee that is allocated to intercollegiate athletics?

___ Yes

___ No

b If yes does payment of this fee provide guaranteed admission to your major sports events?

___ Yes

___ No

c If no such specific fee is assessed is some portion of a general activity fee paid by students allocated to intercollegiate athletics without entitling admission to athletics events?

___ Yes

___ No

d Does your institution award athletics grants-in-aid? (The term "grants in aid" refers to any institutionally administered financial aid awarded to a student who has been

II. ORGANIZATION AND ACTIVITY DATA

Please provide the following organization and activity data for your **intercollegiate athletics** programs during the 1992-93 academic year. Do not include intramural or club sports.

	Program	
	Men's	Women's
1 Total number of athletes participating in all intercollegiate sports, including junior varsity, etc.		
2 Total number of athletes participating in intercollegiate sports, **varsity only**		
3 Total number of varsity-level sports offered		
4 Total number of **full-time equivalent** coaching personnel		
5 Actual number of coaching personnel, including part-time (head-count)		
6 Total number of equivalent annual full grants-in-aid		
a Athletics aid equivalencies from revenue distribution plan (Division I only)		
b All countable grants, etc., including athletics aid equivalencies (all divisions)		
7 Average annual cost of full grant-in-aid		
a In-state	$	
b Out-of-state	$	
8 Total number of full-time equivalent noncoaching personnel excluding students employed by athletics department (men's and women's programs combined)		

recruited on the basis of athletics ability or any athletically related financial aid provided to a student-athlete regardless of recruitment)

___ Yes

___ No

Mark each of the following factors that you believe to be **significantly** responsible for increasing annual operating expenses of the athletics program at your institution during the past four years.

___ a Increased squad size in one or more men's sports

___ b Increased squad size in one or more women's sports

___ c Program expansion into men's sports not previously offered.

___ d Program expansion into women's sports not previously offered

___ e Increased number of coaching personnel for men's sports

___ f. Increased number of coaching personnel for women's sports

___ g Increased number of grants-in-aid awarded in men's sports

___ h Increased number of grants-in-aid awarded in women's sports

___ i Increased recruiting costs in men's sports

___ j Increased recruiting costs in women's sports

___ k. Increased annual cost of a full grant in-aid

___ l Increased base salaries for athletics department personnel

___ m Increased commercial air fares for team travel

___ n. Expansion of facilities used in athletics

___ o Increased number of noncoaching athletics department personnel (associate and assistant athletics directors managers athletics trainers etc)

___ p Other _____

Concerning the problem of rising costs of intercollegiate athletics mark the one statement that best describes the nature of the problem at your institution

___ a The problem is serious and methods are needed to control major expenses and eliminate unnecessary costs

___ b The problem is not a major concern because revenues also have increased in the past few years

___ c The problem is not a major concern because revenues derived from intercollegiate athletics are not intended to cover all operating expenses anyway

___ d The problem is not serious and is explained adequately by reference to general inflationary trends alone

III. REVENUE AND EXPENSE INFORMATION

The following schedules request revenue and expense information for your institution's academic year that ended within the 1993 calendar year. All data should pertain to intercollegiate athletics only, excluding intramural sports, club sports and physical education. We ask that you answer all questions to the best of your ability. Please round your responses to the nearest $1,000 and eliminate cents.

SCHEDULE A — TOTAL REVENUES

Total revenues directly related to a particular sport should include admissions, concessions, advertising, broadcasting fees and similar items for each sport, to the extent that identification is possible. Guarantees and options should be included. Specific gender related revenues are asked for first, with revenues that are not directly related to either the men's or women's programs added at the bottom of the schedule.

TOTAL ATHLETICS REVENUES
Fiscal Year 1992-1993

	Program	
	Men's	Women's
Football	$_____	$ N/A
Basketball	_____	_____
All Other Sports	_____	_____
All Other Revenues Not Related to Specific Sports	_____	_____
Total Revenues by Gender (Sum of each column)	(a) _____	(b) _____
Total Gender-Related Revenues (a+b)	(c) _____	
Revenues Not Directly Related to Either Men's or Women's Programs	(d) _____	
Total Athletics Revenues (c+d)	$ _____	

SCHEDULE B — REVENUES BY SOURCE

Amounts reported in this schedule should include men's and women's intercollegiate athletics programs combined. Do not include intramural sports, club sports or physical education. If a particular revenue source does not apply to your institution, indicate with "None" in the appropriate space. **Please round your responses to the nearest $1,000 and eliminate cents.**

REVENUES BY SOURCE
Combined Men's and Women's Programs
Fiscal Year 1992-1993

Total ticket sales (Do not reduce by guarantees paid.):	
Sales to public and university faculty/staff	$ _____
Sales to students	_____
Postseason compensation	_____
Bowl games	_____
Tournaments	_____
Television	_____
NCAA distributions	_____
Conference distributions	_____
Other	_____
Student activity fees (if not included above)	_____
Guarantees and options received (away games)	_____
Cash contributions from alumni and others	_____
Direct state or other government support	_____
Institutional support (including salaries, cash, tuition waivers, etc.)	_____
Other revenues intended for intercollegiate sports	_____
Concessions	_____
Radio/television	_____
Special events	_____
Program sales/advertising	_____
Signage/sponsorship/royalties	_____
Sports camps	_____
All other	_____
Total Revenues (Must agree with Schedule A)	$ _____

SCHEDULE C — TOTAL OPERATING EXPENSES

Total operating expenses directly related to a particular sport should include grants-in-aid coaches' salaries team travel, equipment game expenses recruiting expenses and other clearly identifiable expense items for each sport. Please do not prorate or allocate general overhead expenses of the athletics program to the various sports. However, a portion of the salaries of the athletics director and other administrators should be allocated to specific sports if these persons have coaching responsibilities for those sports. General expenses should include administrative salaries, clerical salaries, publicity and promotional expenses and all other expense items of a general overhead nature that are not related to a specific sport but are related to a specific gender. Expenses related to "common sports," such as a combined men's/women's track program, should be allocated by gender based upon the number of participants of each gender. Gender related expenses are asked for first, with expenses that are not directly related to either the men's or women's programs added at the bottom of the schedule. If it is not possible to identify or allocate an expense item by gender, the item should be included on the space marked (d). Please round your responses to the nearest $1,000 and eliminate cents.

TOTAL OPERATING EXPENSES
Fiscal Year 1992-1993

	Program	
	Men's	Women's
Football	$_____	$ N/A
Basketball	_____	_____
All Other Sports	_____	_____
All Other Operating Expenses Not Related to Specific Sports	_____	_____
Total Expenses by Gender (Sum of each column)	(a) _____	(b) _____
Total Gender Related Expenses (a+b)	(c) _____	
Expenses Not Directly Related to Either Men's or Women's Programs	(d) _____	
Total Athletics Operating Expenses (c+d)	$ _____	

SCHEDULE D

Please see Instructions for Schedule C. Expenses directly related to or allocated to (per Schedule C Instructions) either the men's or women's programs should be indicated in the appropriate column. Expenses not directly related to gender should be included in the Administrative column. Please do not allocate administrative expenses. **The totals from this schedule must equal the totals from Schedule C. Please round your responses to the nearest $1,000 and eliminate cents.**

OPERATING EXPENSES BY OBJECT OF EXPENDITURE
Fiscal Year 1992-93

	Men's Program	Women's Program	Administrative
Grants in aid	$_____	$_____	$_____
Guarantees and options paid	_____	_____	_____
Salaries, wages and fringe benefits	_____	_____	_____
Team travel	_____	_____	_____
Scouting and recruiting	_____	_____	_____
Athletics equipment, uniforms and supplies	_____	_____	_____
Fund-raising	_____	_____	_____
Insurance	_____	_____	_____
Contract services (medical, legal, game officials, ticket sellers, etc.)	_____	_____	_____
Other	_____	_____	_____
Total operating expenses (Must agree with Schedule C)	_____	_____	_____
Other expenditures			
Debt service	_____	_____	_____
Capital expenditures	_____	_____	_____
Total Expenses	$_____	$_____	$_____

REFERENCES

Acosta, R.V , & Carpenter, L.J (1990) Women in intercollegiate sport. (Available from Acosta & Carpenter, Dept of Physical Education, Brooklyn College, Brooklyn, NY 11210)

Agresti, A , & Finlay, B (1986) Statistical methods for the social sciences (2nd ed) San Francisco: Dellen

Ahumada, M M (1983) An economic analysis of a Latin American university--the international application of U S costing techniques Dissertation Abstracts International, 44 (11), 3295A. (Abstract No 8404657)

Anderson, D M (1992) A new approach to educational efficiency Linking resource use to educational outcomes in urban and rural schools Dissertation Abstracts International, 53 (11), 3798A (Abstract No 9308249)

Beckett, J (1994, May 16) There are no easy answers The Ann Arbor News, pp D1, D6

Bias found at L S U in Title IX ruling. (1996, January 13) The New York Times, p A12

Blum, D E (1993, August 11) Men turn to federal anti-bias laws to protect team from chopping block The Chronicle of Higher Education A33-34

Blum, D E (1995, February 24) Virginia Tech will add two women's sports to settle suit. The Chronicle of Higher Education, A39

Blum, D E (1996, January 26) Measuring equity: Federal judge rejects common test used in Title IX disputes over athletics The Chronicle of Higher Education, A33-34)

Bonnette, V M (1994) Title IX basics In the National Collegiate Athletic Association (Ed) Achieving gender equity, A basic guide to Title IX for colleges and universities (pp 5-26) Overland Park, KS Author

Branham, J P (1994) Assessing the extent to which leaders in intercollegiate athletics favor the structural reform recommendations of the Knight Foundation Commission. Dissertation Abstracts International, 55 (4) 875A. (Abstract No 9423574)

Cannon v University of Chicago, 441 U.S 677 (1979)

Chatterjee, S , & Price, B (1991) Regression analysis by example (2nd ed) New York John Wiley & Sons

Ching, C T K , & Yanagida, J F (1985) Production economics, Mathematical development and applications New Brunswick, NJ Transaction, Inc

Cohen, J (1977) Statistical power analysis for the behavioral sciences New York Academic Press

Cohen v Brown University, 991 F 2d 888 (1st Cir)

Cook, T D , & Campbell, D T (1979) Quasi-experimentation. Design & analysis issues for field settings Boston Houghton Mifflin

Curtis, T (1995, April) Men's sports programs and Title IX compliance in intercollegiate athletics The Florida Bar Journal, 63-65

ESPN's U S 500 hopes to lap Indy (1996, January 15) USA Today, p 3C

Favia v Indiana University of Pennsylvania, 812 F Supp 578 (W D Pa. 1993).

Florida Study Commission on Women's and Girl's Participation in Athletics and Extracurricular Activities (1993 January) Women's and girl's participation in athletics and extracurricular activities Tallahassee, FL Florida Department of Education

Frankel, E (1992, November) Leveling the field Athletic Management, 15-19

Franklin v Gwinnett County Public Schools, 112 S Ct. 1028 (1992)

Frisbee, W R (1981) An examination of institutional and student inputs to education and their impact on academic performance at the college level (Doctoral dissertation, Cornell University, 1981). Dissertation Abstracts International, 41 (12), 4993A

Fulks D L. (1994) Revenues and expenses of intercollegiate athletics programs. Financial trends and relationships--1993 Overland Park, KS NCAA

Garrett, J A (1985) College and university administrators' attitudes toward the values of intercollegiate athletics at selected NCAA Division I, II, and III institutions Dissertation Abstracts International, 46 (10), 2937A (Abstract No 8528323)

Grove City College v Bell, 465 U S 555 (1984)

Hattig S A (1994) A study of progress toward gender equity in the intercollegiate athletics program at a major research institution. Dissertation Abstracts International, 56 (02), 0472A (Abstract No 9518759)

Heckman, D (1992) Women & athletics: A twenty year retrospective on Title IX University of Miami Entertainment & Sports Law Review, 9(1), 1-64

Herwig, C (1995, March 30) Brown to appeal Title IX decision. USA Today, p 3C

Hicks, L L (1991) An investigation of selected predictor variables of academic performance of freshmen athletes and nonathletes at a national association of intercollegiate athletics institution Dissertation Abstracts International, 52 (4), 1194A (Abstract No 9127668)

Huang, H E (1993) The determinants of institutional effectiveness of the senior high schools in the Shenzhen Special Economic Zone of China. Dissertation Abstracts International, 54 (04), 1173A. (Abstract No 9324542)

Kelly v Board of Trustees of the University of Illinois No 93-3205, 1994 U S App Lexis 23974 (7th cir Sept 1, 1994), affg 832 F Supp 237 (C.D Ill 1993)

Kiechel v Auburn University, Civil No 93-V-474-E (M D Ala. July 19, 1993)

Kim, L Y (1992) Factors affecting student learning outcomes. A school-level analysis of the 1990 NAEP mathematics trial state assessment (Doctoral dissertation, University of Southern California, 1992) Dissertation Abstracts International, 53 (12), 4153A

Knight Foundation Commission on Intercollegiate Athletics (1991, March) Keeping faith with the student-athlete. A new model for intercollegiate athletics. Charlotte, NC Author

Kurth v University of California Regents, Civil No SC 029577 (Cal Sup Ct May 17, 1994)

Lopez, E.S. (1994). Social capital and the pre-labor market environment as mediators of educational choices and outcomes for Latino and Anglo students (Doctoral dissertation, University of California, Davis, 1994). Dissertation Abstracts International, 55 (11), 3600A.

Moran, M. (1992, March 19). Sex equality puts stress on athletics. New York Times, pp. 1D, 4D.

National Collegiate Athletic Association. (1993, May). Preliminary report from the NCAA Gender-Equity Task Force. St. Louis, MO: Author.

National Collegiate Athletic Association. (1994, November). The NCAA [Brochure]. Overland Park, KS: Author.

Office for Civil Rights. (1996). Clarification of intercollegiate athletics policy guidance: The three-part test. Washington, D.C.: U.S. Department of Education.

Purdue coach Keady's father dies, daughter has surgery. (1996, January 13). The Atlanta Journal & Constitution, p. 5D.

Rebne, D.S. (1988). Determinants of individual productivity: The case of academic research (Doctoral dissertation, University of California, Los Angeles, 1988). Dissertation Abstracts International, 50 (01), 0084A.

Roberts v. Colorado State Bd. of Agriculture, 998 F.2d 824 (10th Cir. 1993), cert. denied, 114 S.Ct. 580 (1993).

Sanders v. University of Texas at Austin, Civil No. A-92-CA-405 (W.D. Tex. Oct. 24, 1993).

Schuck v. Cornell University, Civil No. A-92-CV-756 FJS-FJD (N.D.N.Y. Dec. 8, 1993).

Semo, J.J., & Bartos, J.F. (1994). A guide to recent developments in Title IX litigation. In the National Collegiate Athletic Association (Ed.), Achieving gender equity: A basic guide to Title IX for colleges and universities (pp. 27-41). Overland Park, KS: Author.

Shugoll, M.A. (1980). The equality and productivity of state aid to elementary and secondary education. Dissertation Abstracts International, 41 (03), 1202A. (Abstract No. 8018819).

Smith, R.K. (1996, January 22). To achieve equity, identify new resources. The NCAA News, 33(3), 4-5

Smolka, B. (1995). Leveling the field. Bucknell World, 23(5), 4-5

Sterrett, J. D. (1984). Development and promotion officers and athletic revenues: Selected characteristics at NCAA member institutions. Dissertation Abstracts International, 45, (7), 2032A. (Abstract No. 8419848)

Stevens, J. (1992). Applied multivariate statistics for the social sciences (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Thro, W. E., & Snow, B. A. (1993, October 7). Cohen v. Brown University and the future of intercollegiate and interscholastic athletics. Educational Law Reporter, 84, 611-628.

Younger, M. S. (1979). Handbook for linear regression. North Scituate, MA: Duxbury Press.

BIOGRAPHICAL SKETCH

Marysitzabeth Grace was graduated *magna cum laude* from Brown University in 1992 with a Bachelor of Science degree in electrical engineering. After working as an engineer on several projects for federal civilian agencies, Ms. Grace enrolled in a program of graduate study in the Department of Exercise and Sport Sciences at the University of Florida. Under the direction of Dr. Scott Powers, she studied muscle biochemistry for her master's thesis research. After receiving her Master of Science degree in 1994, Ms. Grace commenced her doctoral studies in higher education administration at the University of Florida under the direction of Dr. David Honeyman. During Ms. Grace's graduate study, she was employed as a graduate assistant with Tom Jones, University of Florida Head Women's Track and Field Coach, for two years. Ms. Grace then served as the administrative assistant for women's sports at the University of Florida working under the direction of Ann Marie Rogers, Associate Athletic Director. Ms. Grace has had a lifelong interest in sport and has been an active participant. Throughout her college career, she has been surrounded by the issues of gender equity and aspires to be a leading educator and researcher in the area.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality as a dissertation for the degree of Doctor of Philosophy

David S. Honeyman, Chair
Professor of Educational Leadership

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate in scope and quality as a dissertation for the degree of Doctor of Philosophy

Dale F. Campbell
Professor of Educational Leadership

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy

R. Craig Wood
Professor of Educational Leadership

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality as a dissertation for the degree of Doctor of Philosophy

M. David Miller
Associate Professor of Foundations of Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy

Nancy S. Whiddon
Professor of Exercise and Sport Sciences

This dissertation was submitted to the Graduate Faculty of the College of Education and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy

August 1996

Roderick J. McDavis
Dean, College of Education

Dean, Graduate School